

**AIR RESOURCES BOARD
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY**

**2002 CALIFORNIA
PM_{2.5} MONITORING
NETWORK DESCRIPTION**

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California Environmental Protection Agency



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EXECUTIVE SUMMARY

This is the fifth annual report documenting PM_{2.5} network design and implementation efforts in California. The goal of the PM_{2.5} monitoring program in California is to provide ambient data that support the State and national air quality programs, including mass measurements and speciation data. Data from this program will be used to identify nonattainment areas, develop and track implementation plans, assess regional haze, assist in health effects studies, and support other ambient aerosol research activities. A draft of this document was reviewed by staff of the local air quality districts in California, the Region 9 offices of the U.S. Environmental Protection Agency (U.S. EPA), and several organizational units of the Air Resources Board (ARB).

This document provides an overview of the PM_{2.5} implementation effort in California to date. Our progress in implementing the PM_{2.5} monitoring network is summarized in the table below and on the map on the next page (Figure 1).

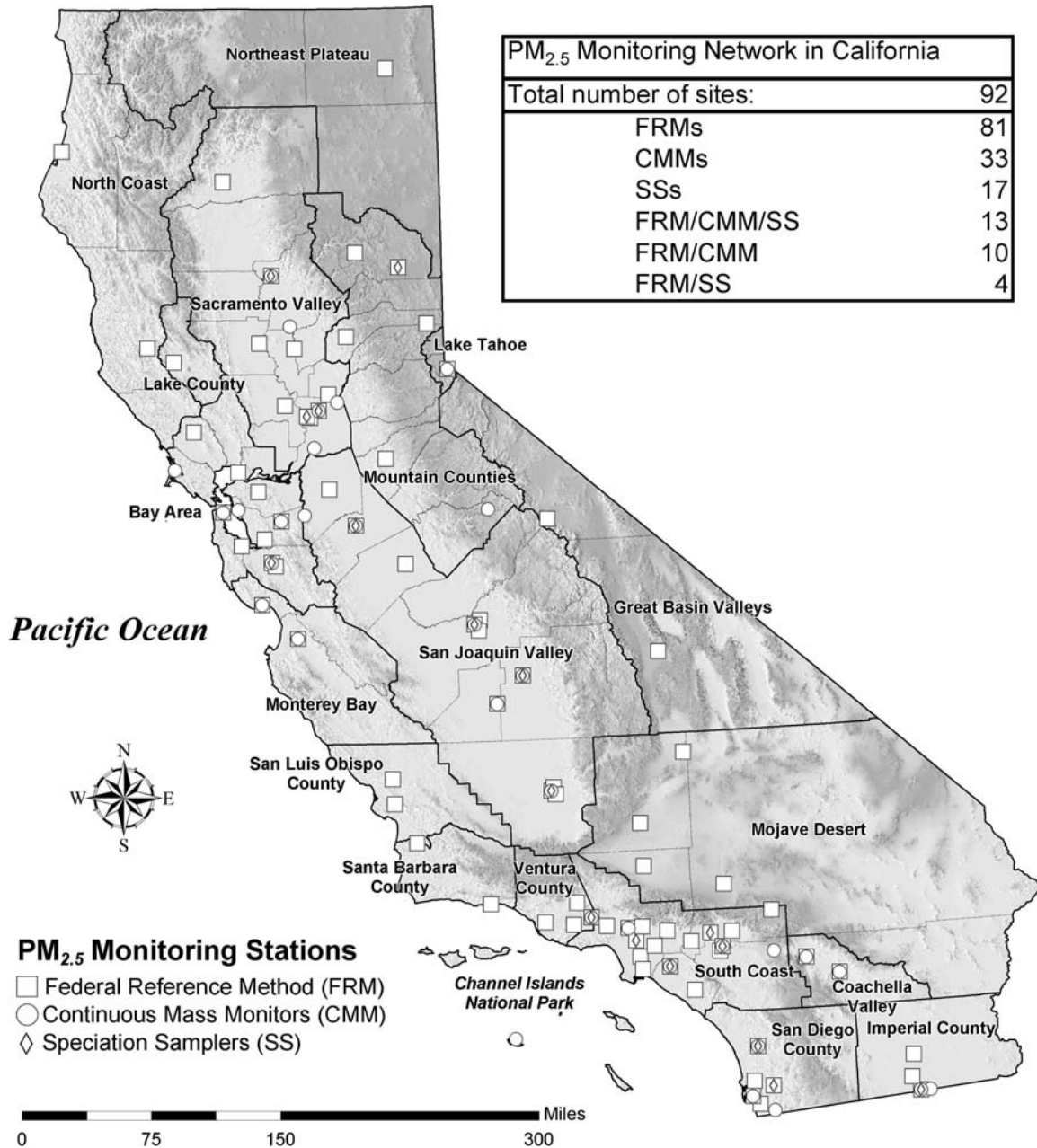
Table 1
PM_{2.5} Network Implementation

Network Element	Number Deployed	Number Planned	Purpose
24-hour Mass	81 sites	None	Comparison with State and national standards.
Continuous Mass	33 sites	11 sites	Comparison with State standards. Public reporting, aerosol research, background monitoring, and transport assessment.
24-hour Speciation	17 sites	None	Characterization of aerosols, development of emission control strategies, and tracking progress of control programs.
Laboratory	8 laboratories	None	Weighing mass filters.

This year's network description addresses the current status of the network and plans for changes to the network. The State's network of mass monitors that provide data values that are 24-hour-averages is fully deployed at this time.

Plans for the coming year include the addition of continuous mass monitors at 11 more sites and the addition of second continuous mass monitors for quality assurance purposes at a few more sites than now have them. In addition, several continuous mass monitors now deployed for a special study in the Lake Tahoe area will be available for redeployment in the spring of 2004. Also, new federal monitoring regulations may become effective in 2004. Potential impacts of the regulations will need to be evaluated. The new federal requirements may allow California air quality agencies to consider reducing the sampling frequency for some 24-hour mass samplers and reducing, probably to a

Figure 1
Existing PM_{2.5} Monitoring Sites



limited degree, the number of PM_{2.5} monitoring sites. These planned efforts are discussed more in Chapter 3.

Most of the existing sites in California's PM_{2.5} monitoring network have been in operation since early 1999 and now have three or four complete calendar years of data. The existing data are sufficient for making some comparisons among the sites (refer to Chapter 4, Section A. and Appendix C for a more complete discussion).

The data show that the highest 24-hour PM_{2.5} mass concentrations vary widely throughout the State. Table 2 shows the range of highest PM_{2.5} concentrations for sites in California, as measured by the type of sampler used for regulatory comparisons.

Table 2
Range of Highest PM_{2.5} Concentrations for Sites in California
(Based on 1999 through 2002 Data)

Averaging Time	Lowest		Highest	
	Site	Concentration	Site	Concentration
24-hour - Maximum	Echo Summit	10.0 µg/m ³	Fresno-1st Street	160 µg/m ³
Annual Average - Maximum	Echo Summit	3.8 µg/m ³	Bakersfield - 5558 California Avenue	31.2 µg/m ³

In general, both the highest 24-hour and annual average PM_{2.5} concentrations are found at sites in the South Coast Air Basin and San Joaquin Valley Air Basin. A number of sites in both these air basins have 24-hour and annual average concentrations that are above the levels of the national standards. Relatively high 24-hour and annual average measurements are also found in the San Diego Air Basin and in limited parts of the Sacramento Valley, the San Francisco Bay Area, Salton Sea, and Mountain Counties Air Basins. Appendix C. includes summaries of the PM_{2.5} data for 1999 through 2002.

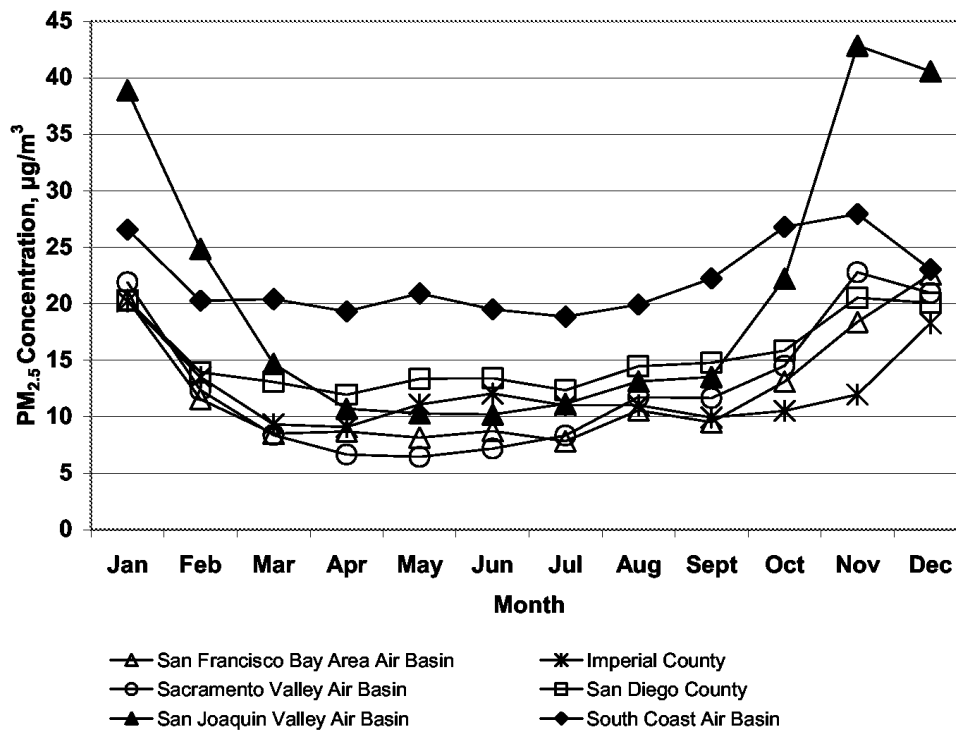
Typically, the highest 24-hour concentrations in most, but not all, of the State occur in November, December, and January, while the lowest concentrations occur between March and August. Most of the California air basins follow this seasonal pattern to some degree. The South Coast Air Basin is an exception to this. In the South Coast Air Basin, fairly high values occur throughout the year. This seasonality is illustrated for a number of air basins in Figure 2.

The seasonality is most pronounced in the San Joaquin Valley Air Basin, where the November-December-January concentrations were on the order of four to five times greater than those for March through August. The seasonality is also quite pronounced in the Sacramento Valley Air Basin and San Francisco Bay Area Air Basin, but less pronounced in the San Diego Air Basin, Imperial County, and Mountain Counties Air Basin. In other areas, the highest concentrations

occurred throughout the year, or concentrations tended to be quite low throughout the year.

This contrast in PM concentrations is part of what makes the PM problem in California so difficult and complex. The emission sources can be very diverse from one area to another. Furthermore, because of the variety of sources and the size and chemical composition of the particles, both the nature and causes of the PM problem can vary considerably from area to area. As a result, even though two areas may have similar concentrations, they may have very different PM problems. To add to the complexity, a single area may have a different type of PM problem during different times of the year. The data collected from PM monitoring programs will help in making strides toward understanding and controlling the PM problem.

Figure 2
Monthly Average PM_{2.5} Concentrations by Area
(1999 – 2002)



CHAPTER 1

INTRODUCTION

Particulate matter (PM) has long been a concern for air quality officials because of its adverse impacts on health and visibility. PM is any material, except pure water, that exists in the solid or liquid state in the atmosphere. The size of particulate matter can vary from coarse wind blown dust particles to fine particle combustion products. PM is generally divided into two major categories: PM₁₀ and PM_{2.5}. PM₁₀ comprises particles with an aerodynamic diameter less than or equal to a nominal 10 microns (about 1/7 the diameter of a single human hair). Their small size allows them to make their way to the air sacs deep within the lungs where they may be deposited and result in adverse health effects. PM₁₀ also causes visibility reduction. PM_{2.5} is a subset of PM₁₀ and includes those particles with an aerodynamic diameter less than or equal to a nominal 2.5 microns. PM_{2.5} is primarily a product of combustion. Particles within the PM_{2.5} fraction of PM₁₀ penetrate more deeply into the lungs, and cause the majority of the visibility reduction attributable to PM.

On July 18, 1997, the U.S. EPA promulgated new National Ambient Air Quality Standards for PM_{2.5}. Although there were existing PM₁₀ monitors nationwide in 1997, there was no national PM_{2.5} monitoring network. ARB staff have worked closely with the U.S. EPA to expeditiously deploy PM_{2.5} monitors throughout California. This document fulfills a federal requirement that the states submit an annual PM_{2.5} monitoring network description.

Last year, the ARB and the Office of Environmental Health Hazard Assessment (OEHHA) concluded a review of the State particulate standards for their ability to adequately protect public health, including that of infants and children. This review included an evaluation of PM_{2.5}. In June 2002, the Board adopted recommendations to establish a new annual State PM_{2.5} standard. The national and State PM standards are listed in Chapter 4, Section A.2. At its February 2004 meeting, the governing board of the ARB will consider for regulatory approval the initial State area designations for PM_{2.5}.

As California moves forward with its PM monitoring program, data from the PM_{2.5} monitoring program will be used for assessing attainment of the national and State standards, developing and tracking implementation programs, assessing regional haze, and assisting health effects studies and other ambient aerosol research activities. Since 1998, the ARB and local air pollution control districts and air quality management districts (air districts) have established a comprehensive network of PM_{2.5} monitoring sites and developed an infrastructure for the program (ARB, 1998; ARB, 1999; ARB, 2000; ARB, 2001). The main network of PM_{2.5} monitoring sites are sometimes referred to as "Federal Reference Method" (FRM) sites. The FRM sites collect 24-hour mass data using federally approved methods, which means they satisfy specific federal

regulatory requirements. These requirements ensure that data from these sites are suitable for comparison with the national PM_{2.5} standards.

California's PM_{2.5} monitoring network now includes 81 FRM monitoring sites. The 24-hour PM_{2.5} mass samplers at all 81 sites are designated as State and Local Monitoring Stations (SLAMS), and the samplers at 20 of those sites are proposed for designation as National Air Monitoring Stations (NAMS). NAMS sites are part of a federal network meant to measure long-term PM_{2.5} trends, while SLAMS sites (which include the NAMS as a subset) collect data needed for developing an effective State Implementation Plan (SIP).

The monitoring network also includes 33 sites with continuous PM_{2.5} mass monitors; 17 sites with 24-hour PM_{2.5} speciation samplers; and eight fully equipped laboratories for weighing PM_{2.5} FRM filters. The monitoring program also includes a comprehensive quality assurance program.

In the next 12 months, the ARB and the air districts plan to include the addition of continuous mass monitors at 11 more sites and the addition of second continuous mass monitors for quality assurance purposes at a few more sites than now have them. In addition, several continuous mass monitors now deployed for a special study in the Lake Tahoe area will be available for redeployment in the spring of 2004. Also, new federal monitoring regulations may become effective in 2004. Potential impacts of the regulations will need to be evaluated. The new federal requirements may allow California air quality agencies to consider reducing the sampling frequency for some 24-hour mass samplers and reducing, probably to a limited degree, the number of PM_{2.5} monitoring sites. These planned efforts are discussed more in Chapter 3.

The remaining sections of this document describe California's existing and proposed PM_{2.5} monitoring network and related activities. Chapter 2 summarizes the PM_{2.5} elements funded and deployed prior to December 31, 2002, while Chapter 3 describes changes to and evaluations of the network planned during the next twelve months. Chapter 4 outlines PM_{2.5} data analysis, completeness, and distribution.

In addition to these chapters, there are five appendices. Appendix A provides a table of the PM_{2.5} mass monitoring sites in California that can be used for regulatory comparisons to the standards, along with operating agency, type of monitor, date of first valid sample, sampling schedule, and supporting lab. Appendix B includes a table of existing and planned PM_{2.5} monitoring sites in California and lists the types of PM_{2.5} samplers operating at each site, including the filter-based and continuous monitors for PM_{2.5} mass and speciation. Appendix C includes a summary of data collected at sites in the PM_{2.5} FRM mass network from 1999 to 2002. Appendix D provides a list of acronyms used in this document. Finally, Appendix E is a glossary that describes the technical terms used in this document.

CHAPTER 2

SUMMARY OF PM_{2.5} MONITORING NETWORK THROUGH DECEMBER 2002

This chapter discusses the status of the PM_{2.5} network as of December 2002. Included are descriptions of the current FRM mass sampler, continuous mass sampler, and speciation sampler networks. Also included are short discussions of currently deployed background, and transport monitors. Two appendices are close companions to this chapter: Appendix A describes all sites in the FRM mass sampler network, including each site's operating agency and analysis laboratory, sampling schedule, and first valid sampling date; and Appendix B summarizes all existing and planned routine PM_{2.5} monitoring in California.

A. Federal Reference Method (FRM) Mass Samplers

The primary objective of the PM_{2.5} mass monitoring program is to identify areas where PM_{2.5} concentrations exceed the national or State PM_{2.5} standards. These air quality standards are listed in Chapter 4, Section A.2. The network currently includes 81 operational FRM monitoring sites. Data from FRM samplers are suitable for comparison with the national PM_{2.5} standards and therefore, suitable for determining national attainment and nonattainment status. Data from the FRM samplers and certain State-approved continuous mass monitors can be used to determine State attainment and nonattainment status for the State PM_{2.5} standard.

The installation of PM_{2.5} FRM sites began in 1998 and is now complete. The current deployment status is summarized in Appendix A. This past year, PM_{2.5} monitoring at the Echo Summit site was discontinued. Concentrations at this site were very low. The locations of the 81 deployed sites are shown in Figure 3.

1. Network Design

As required by federal regulations, the ARB and the air districts divided California into 18 areas called Monitoring Planning Areas (MPAs), for the purpose of planning a PM_{2.5} monitoring network. The MPAs provide geographical divisions for PM_{2.5} monitoring network planning based on an analysis of population, political boundaries, geography, and meteorology. With few exceptions, the boundaries of the MPAs correspond to the boundaries of the various air basins in California. The MPAs are shown in Figure 3.

Figure 3
PM_{2.5} FRM Mass Monitoring Sites
(with Monitoring Planning Areas and Counties)



During the PM_{2.5} network design process, five objectives were given highest priority. These objectives are:

- Satisfy the U.S. EPA monitoring requirements.
- Represent California's air basins and provide geographical representation.
- Represent high concentrations in populated areas.
- Characterize emission sources in high concentration areas.
- Consider the need for particle measurements in ongoing special health studies.

In addition to collecting data for determining attainment status with respect to the national standards, many FRM sites satisfy other monitoring objectives, including transport assessment and assistance in health studies. Each of the California air basins has at least one FRM PM_{2.5} mass monitoring site. Air basins with high population and high PM_{2.5} concentrations have additional monitoring sites to provide better geographical representation.

The filter-based PM_{2.5} mass samplers used in California's PM_{2.5} monitoring network are identified as FRM samplers by the U.S. EPA. The State monitoring network includes two basic types of FRM samplers: sequential samplers which have several filters to allow sampling over several 24-hour periods, and single-channel samplers, with only one filter. The sequential FRM samplers have been deployed for the most part in high population and/or high concentration areas to accommodate more frequent sampling (everyday or one-in-three day). The single-channel FRM samplers have been deployed in less populated areas with estimated PM_{2.5} concentrations below the national standards. Information about all the samplers in the FRM network is summarized in Table 3. Appendix A lists whether each site has a sequential sampler or a single-channel sampler.

Table 3
PM_{2.5} FRM Samplers in California's Monitoring Network

Sampler Type	Number of Sites
Sequential FRM	65
Single-channel FRM	16
Total	81

The expected sampling frequency of the FRMs varies from site-to-site. Some sites sample everyday, some every third day, and some every sixth day. The expected sampling frequencies are listed in Appendix A.

A number of sites in the network have collocated FRM samplers, i.e., a second FRM sampler that is the same make and model as another FRM sampler at a site. Collocated samplers are used to estimate the precision and bias of the various PM_{2.5} samplers. The sites at which collocated samplers are deployed are identified in Appendix A.

In December 2002, the U.S. EPA issued a direct final rule reducing the required number of collocated PM_{2.5} FRM sites. In response, the ARB and the air districts in California reviewed the network of collocated PM_{2.5} FRM samplers. As a result of this review, the ARB and the districts sought and received approval from the U.S. EPA's Region 9 offices to discontinue the collocated PM_{2.5} sampling at five sites. Involved are one collocated single-channel sampler at Ukiah and four collocated sequential samplers at the Fremont, Salinas, Anaheim, and Fontana sites.

There are eight laboratories in California that are certified to weigh and archive the FRM filters. These are operated by the ARB, Bay Area AQMD, Great Basin Unified APCD, Lake County AQMD, Mojave Desert AQMD, San Diego County APCD, South Coast AQMD, and Ventura County APCD. All eight laboratories meet the necessary conditions for submitting data to the U.S. EPA. The methodology used to analyze the PM_{2.5} mass samples collected on Teflon filters is summarized in the Standard Operating Procedure for Mass Analysis of Fine Particulate Collected on Teflon Filters included in the Quality Assurance Project Plan (ARB, 2001b).

2. NAMS Designations

Federal regulations require that some PM_{2.5} mass monitoring sites within California be designated as NAMS sites. Final approval for designating sites as NAMS rests with the U.S. EPA. In the *2000 Network Description* (ARB, 2000), ARB recommended that 20 sites be designated as NAMS. The U.S. EPA is in the process of replacing the regulations requiring NAMS designations, and has not yet taken final action in approving these proposed designations.

Table 4 lists the sites in California that the ARB and the air districts have designated as NAMS trends sites for PM_{2.5} mass. In developing the list, we gave preference to sites with high ambient PM_{2.5} mass concentrations and located in areas with high populations, that have been in operation for several years (monitoring PM₁₀), and that are likely to remain in operation for the foreseeable future. Also, we selected sites that broaden the geographical representation of the network and that have the most frequent sampling schedules.

B. Continuous PM_{2.5} Mass Samplers

The primary objective of continuous PM_{2.5} mass monitoring is to obtain diurnally resolved data. These data are useful for public reporting, understanding diurnal and episodic behavior of fine particles, background monitoring, and transport assessment. Continuous monitors also provide 24-hour average data for the days when filter-based samplers are not operating. ARB and the air districts have deployed continuous PM_{2.5} mass monitors at 33 sites throughout California. Four of these sites also have collocated continuous mass monitors.

The deployed sites along with funding sources for the monitors are listed in Table 5. Most of the deployed monitors are funded from sources other than the Section 103 Grants from the U.S. EPA. Figure 4 shows the locations of all deployed and planned continuous mass monitors. Appendix B contains a complete listing of deployed and planned continuous mass monitors.

Federal regulations require that eight sites, each located in a metropolitan area with a population greater than one million, include continuous PM_{2.5} mass monitors. All of these required sites have been deployed (as shown in bold in

Table 5), except for the monitor at the Los Angeles-North Main Street site. This monitor should be deployed in the next 12 months. Other continuous mass monitors in the Los Angeles area meet and exceed the federal requirement.

Federal regulations also require continuous mass monitors for a background monitoring site and a transport monitoring site in California. Two background monitors, those at Point Reyes and San Nicolas Island, are deployed. Plans for a third background monitoring site in the San Rafael Wilderness Area of Santa Barbara County have been dropped.

Table 4
Proposed NAMS Sites in California's PM_{2.5} Mass Network

Monitoring Planning Area	Site Name	AIRS Site ID
Bay Area AQMD	San Francisco-Arkansas Street	060750005
	San Jose-Jackson Street ¹	060850005
	Vallejo-304 Tuolumne Street	060950004
Great Basin Unified APCD	Mammoth Lakes-Gateway HC ²	060510001
Imperial County APCD	Calexico-Ethel Street	060250005
Mountain Counties Air Basin	Portola-161 Nevada Street ²	060631009
	Quincy-N Church Street ²	060631006
Sacramento Valley Air Basin	Sacramento-Del Paso Manor	060670006
San Diego County APCD	El Cajon	060730003
	San Diego-12 th Avenue	060731007
San Joaquin Valley Unified APCD	Bakersfield-5558 California Avenue	060290014
	Fresno-1 st Street	060190008
	Modesto-814 14 th Street	060990005
	Stockton-Hazelton Street	060771002
	Visalia-N Church Street	061072002
South Coast Air Basin	Anaheim ³	060590002
	Azusa	060370002
	Burbank-W Palm Avenue	060371002
	Los Angeles-North Main Street	060371103
	South Long Beach ³	060374004
	Riverside-Rubidoux	060658001
Ventura County APCD	Simi Valley-Cochran Street	061112002

¹ The Bay Area AQMD relocated the San Jose-4th Street site to a new site called San Jose-Jackson Street.

² Mammoth Lakes, Quincy, and Portola are all potentially smoke-impacted and we have proposed that one should be designated as a NAMS. Before a decision can be made, the involved agencies will need to coordinate on this, and more data will be needed from the Mammoth Lakes site.

³ The South Coast AQMD has relocated the Anaheim-Harbor Blvd site to a new site in the Anaheim area. The district also plans to move the PM_{2.5} FRM sampler from the North Long Beach site to a new site in the South Long Beach area, because special particulate studies indicate that area better represents the expected maximum concentrations experienced in the greater Long Beach area.

Table 5
Deployed Continuous PM_{2.5} Mass Monitors

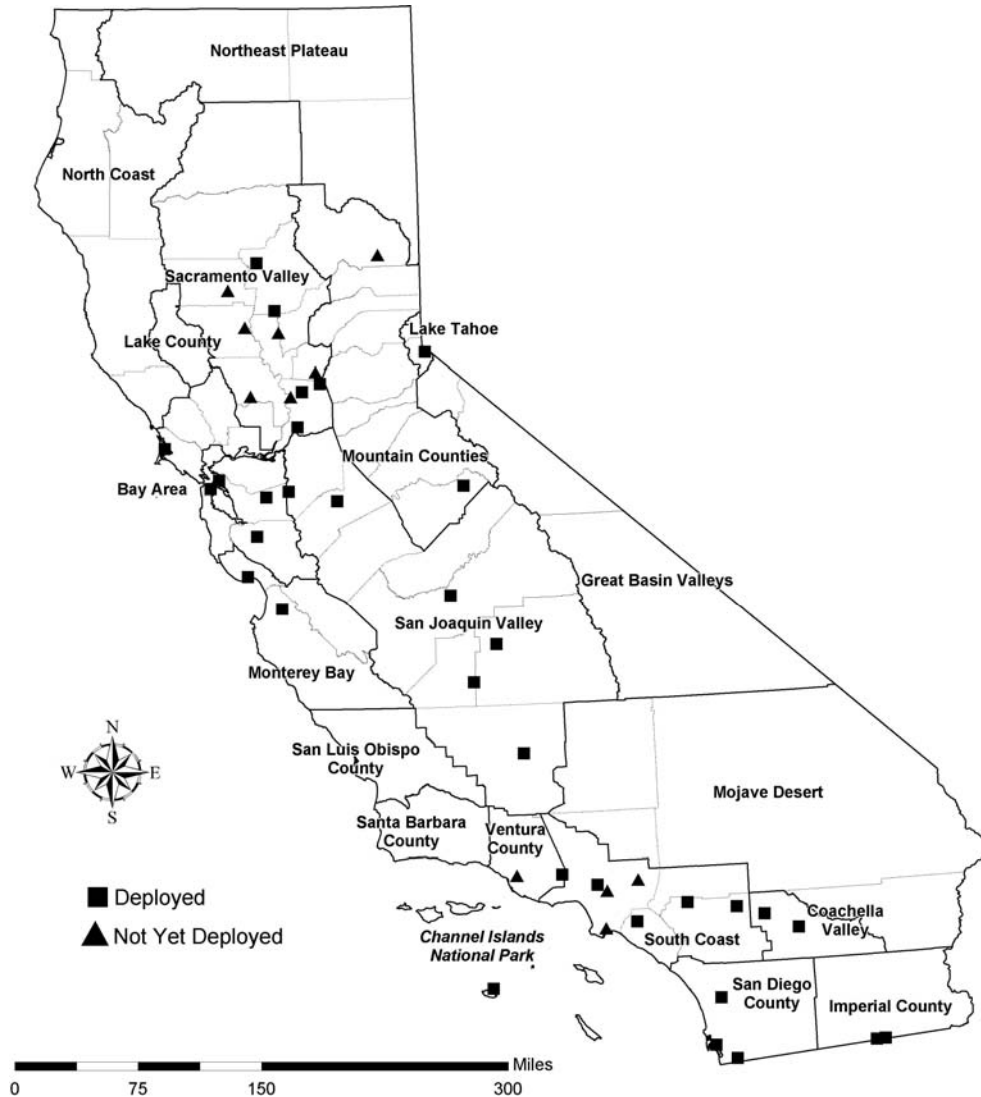
Monitoring Planning Area	Site Name	AIRS Site ID	Funding Source
Bay Area AQMD	Livermore-793 Rincon Avenue	060010007	1999 103 Grant
	Oakland-Filbert	060010008	1999 103 Grant
	Point Reyes	060410003	1999 103 Grant
	San Francisco-Arkansas Street	060750005	1999 103 Grant
	San Jose-Jackson Street	060850004	1999 103 Grant
Coachella Valley	Indio-Jackson Street	060652002	District Funds
	Palm Springs-Fire Station	060655001	District Funds
Imperial County APCD	Calexico-East	060250006	Border Program ¹
	<i>Calexico-Ethel Street</i>	<i>060250005</i>	<i>Border Program¹</i>
Lake Tahoe Air Basin	South Lake Tahoe-Sandy Way	060170011	ARB
Monterey Bay Unified APCD	Salinas #3	060531003	District Funds
	Santa Cruz-2544 Soquel Avenue	060870007	District Funds
Mountain Counties Air Basin	Yosemite Village	060431001	1999 103 Grant
Sacramento Valley Air Basin	<i>Chico-Manzanita</i>	<i>060070002</i>	<i>ARB</i>
	Elk Grove-Bruceville Road	060670011	District Funds
	Folsom-Natoma Street	060670012	District Funds
	Gridley	060074001	ARB
	Sacramento-Del Paso Manor	060670006	1999 103 Grant
San Diego County APCD	Escondido-E Valley Parkway	060731002	1999 103 Grant
	Otay Mesa-Paseo International	060732007	Border Program ¹
	San Diego-12 th Avenue	060731007	Border Program ¹
San Joaquin Valley Unified APCD	<i>Bakersfield-5558 California Avenue</i>	<i>060290014</i>	<i>CRPAQS²</i>
	Corcoran-Patterson Avenue	060310004	
	Fresno-1st Street	060190008	EPA Supersite
	Modesto-814 14 th Street	060990005	CRPAQS ²
	Tracy-24371 Patterson Pass Rd	060773003	1999 103 Grant
	Visalia-N.Church Street	061072002	CRPAQS ²
South Coast Air Basin	Anaheim	060590002	1999 103 Grant
	Banning-Airport	060650012	District Funds
	Burbank-W Palm Avenue	060371002	ARB
	Riverside-Rubidoux	<i>060658001</i>	<i>1999 103 Grant</i>
Ventura County APCD	San Nicolas Island		1999 103 Grant
	Simi Valley-Cochran Street	061112002	ARB

Sites with collocated monitors shown in *italics*. Sites required by federal regulations shown in **bold**.

¹ California-Mexico Border Air Monitoring Program. The ARB owns these monitors.

² California Regional PM₁₀/PM_{2.5} Air Quality Study. These monitors have been distributed to the operating agencies.

Figure 4
PM_{2.5} Continuous Mass Monitoring Sites
(with Monitoring Planning Areas and Counties)



One transport corridor has been selected for initial transport assessment. The pollutant transport corridor between the Bay Area AQMD and San Joaquin Valley Unified APCD via Altamont Pass was selected as the most appropriate corridor for initial assessment because of its documented history of ozone transport, availability of air quality and meteorology data from special studies, and existing infrastructure. The corridor has continuous PM_{2.5} mass measurements collected at Livermore-793 Rincon Avenue and Tracy.

All continuous PM_{2.5} monitors purchased by the ARB are MetOne Model 1020 monitors that have been specifically configured to ARB specifications. The

monitors purchased by the air districts or the California Regional PM₁₀/PM_{2.5} Air Quality Study (CRPAQS) are not necessarily the same model as those purchased by ARB, though all are BAMs. The ARB requested that the manufacturer set up the instruments in a certain way, after determining that different models and different configurations of the BAMs could give significantly different data results. This, in part, is based on an intercomparison study of different BAMs in the Bakersfield area. Some, but not all, air districts are making sure that the BAMs that they purchase meet ARB specifications. Future analyses of BAM data will need to carefully consider the differences. The ARB is working with the air districts to promote the deployment of BAMs configured to ARB specifications at the most important PM_{2.5} monitoring sites.

C. PM_{2.5} Speciation Samplers

Speciation samplers provide valuable information about the composition (and ultimately the sources) of PM_{2.5} pollution. The chemical speciation network in California includes two components: NAMS speciation sites for measuring long-term trends of selected PM_{2.5} constituents and SLAMS speciation sites to collect data needed to develop an effective State Implementation Plan (U.S. EPA, 1999a). Filter-based PM_{2.5} speciation samplers are now located at 17 sites in California. Three sites also have collocated speciation samplers. Figure 5 shows the locations of all deployed speciation monitors. Appendix B contains a complete listing of deployed speciation monitors.

Federal regulations require seven speciation sites in California as part of a nationwide network of NAMS speciation sites. All of the NAMS speciation samplers are deployed, as shown in bold in Table 6. Selection of these seven sites as NAMS speciation trend sites should be considered tentative until sufficient data from the California network are available for evaluation.

The target species of interest for the PM_{2.5} NAMS speciation program consist of:

- anions (particulate sulfate and nitrate) and cations (particulate ammonium, sodium, and potassium);
- trace elements (about 20 key elements from sodium through lead on the periodic table);
- total carbon and semivolatile organic aerosol constituents; and
- particulate mass.

In addition to the seven NAMS speciation sites, ten SLAMS speciation sites have been established. Chemical species measured at SLAMS speciation sites will initially be the same as for the routine NAMS. This may change in the future as we tailor measurements at each site to meet data objectives.

Figure 5
PM_{2.5} Speciation Monitoring Sites
(with Monitoring Planning Areas and Counties)



Based upon its evaluation of several types of monitors, ARB determined that the SASS (i.e., Spiral Aerosol Speciation Samplers) monitor offers significant operational and performance advantages over other filter-based speciation monitors. Deploying SASS monitors at the SLAMS speciation sites is consistent with the SASS monitors that have been deployed at the seven NAMS speciation sites. As a result, SASS monitors have been deployed at most of the speciation sites in California. The exception to this for the South Coast is discussed below.

Table 6
Existing PM_{2.5} Speciation Monitoring Network

The speciation samplers are filter-based PM_{2.5} samplers that collect 24-hour samples. Most 24-hour speciation samplers, with exception of four TEP samplers in the South Coast AQMD, are Spiral Aerosol Speciation Samplers. The labels indicate who owns or would own the monitor (ARB: Air Resources Board; Dist.: the air district). '99 and '01 indicate that the funding comes from the 1999 or 2001 Section 103 grant. All samplers labeled as ARB '99 and Dist. '99 are PM_{2.5} speciation NAMS monitors.

Site Location (by MPA)	AIRS Site ID	PM _{2.5} Speciation Sampling
Bay Area AQMD		
San Jose-Jackson Street	060850005	Dist. '99
Imperial County APCD		
Calexico-Ethel Street	060250005	ARB '01
Mountain Counties Air Basin		
Portola-161 Nevada Street	060631009	ARB '01
Sacramento Valley Air Basin		
Chico-Manzanita Avenue	060070002	ARB '01
Sacramento-Del Paso Manor	060670006	Dist. '99
Sacramento-T Street	060670010	ARB '01
San Diego County APCD		
El Cajon-Redwood Avenue	060730003	Dist. '99
Escondido-E Valley Parkway	060731002	Dist. '01
San Joaquin Valley Unified APCD		
<i>Bakersfield-5558 California Ave</i>	060290014	ARB '99
Fresno-1st Street	060190008	ARB '99
Modesto-814 14 th Street	060990005	ARB '01
Visalia-N Church Street	061072002	ARB '01
South Coast Air Basin		
Anaheim ¹	060590002	Dist.
Fontana-Arrow Highway ¹	060712002	Dist.
<i>Los Angeles-North Main Street¹</i>	060371103	Dist. '01
<i>Riverside-Rubidoux¹</i>	060658001	Dist. '99
Ventura County APCD		
Simi Valley-Cochran Street	061112002	Dist. '99

Sites with collocated monitors are shown in *italics*. Sites required by federal regulation are shown in **bold**; these are the NAMS sites for speciation.

¹ Fontana-Arrow Highway and the new Anaheim site use TEP samplers. Los Angeles-North Main Street and Riverside-Rubidoux have both TEP and SASS samplers operating in parallel. Los Angeles-North Main Street and Riverside-Rubidoux also have collocated SASS samplers.

The South Coast Air Quality Management District has been operating a network of PM_{2.5} speciation samplers as part of their particulate Technical Enhancement Program (TEP). The district has TEP samplers deployed at four sites. Two of these sites, Riverside-Rubidoux and Los Angeles-North Main Street, will operate TEP and SASS samplers in parallel to determine relationships between the two samplers. This may allow for the future replacement of the TEP samplers with SASS samplers by establishing the relationships between the TEP data and SASS data.

The speciation monitoring network includes predominately filter-based samplers and not continuous monitors. Continuous monitors for sulfates, nitrates, and organic particulates do not appear to be ready for reliable, routine operation at network monitoring sites. Evaluation of such instruments in special studies will continue. A few aethelometers are deployed around the State that continuously measure black carbon in a way that generally relates to elemental particulate carbon.

D. Background and Transport Monitoring

Background sites are intended to quantify regionally representative PM_{2.5} concentrations for sites located away from populated areas and other significant emission sources. Background concentrations for the PM_{2.5} program are defined as concentrations that would be observed in the absence of anthropogenic emissions of PM and the aerosol particles formed from anthropogenic precursor emissions of volatile organic compounds, nitrogen oxides, and sulfur oxides. Background monitoring data are important for developing control plans in areas expected to exceed the PM_{2.5} standards.

Two background sites are deployed in California, at Point Reyes and San Nicolas Island sites. Plans for a third background monitoring site in the San Rafael Wilderness Area of Santa Barbara County have been dropped.

As discussed in Chapter 2, Section B, two sites are deployed to monitor pollutant transport between the Bay Area AQMD and San Joaquin Valley Unified APCD, Livermore-793 Rincon Avenue and Tracy. Both of these sites operate a continuous PM_{2.5} mass monitor.

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CHAPTER 3

PLANNED PM_{2.5} NETWORK ACTIVITY

This chapter addresses plans for expanding and changing the PM_{2.5} network during the next year. No additional filter-based FRM samplers or speciation samplers are planned for deployment during 2003. The only specific plans for additional monitors are for the addition of 11 continuous mass monitors, although some possible additional continuous mass monitor deployments are discussed in Section A below. A summary of the main types of PM_{2.5} monitoring instruments being planned for each PM_{2.5} monitoring site, along with what already exists, is included in Appendix B.

In the next 12 months, the ARB, districts, and U.S. EPA may reevaluate the sampling frequency schedules of filter-based FRM mass samplers. The U.S. EPA is revising the regulatory requirements for FRM sampling frequency. The new requirements may take effect in 2004. This is discussed in Section B below.

A. Continuous Mass Monitors

As discussed in Chapter 2, Section B, 33 continuous mass monitors have been deployed.

Table 7 lists 11 continuous PM_{2.5} mass monitors that we expect to be deployed in 2003. Several of the continuous mass monitors listed below for the Sacramento Valley will be used primarily as part of the agricultural burning management program. These locations for additional monitors for the agricultural burning management program are tentative and may be changed.

Plans for the coming year also include the addition of collocated continuous mass monitors for quality assurance purposes at a few more sites than now have them. In addition, several continuous mass monitors now deployed for a special study in the Lake Tahoe area will be available for redeployment in the spring of 2004. Some of these special study monitors may be redeployed as the planned collocated monitors. Other of these monitors may be redeployed to sites in the San Joaquin Valley to augment the existing network of continuous mass monitors.

Table 7
Expected Continuous Mass Monitor Deployments in 2003

Monitoring Planning Area	Site Name	AIRS Site ID	Funding Source
Mountain Counties Air Basin	Portola-161 Nevada Street	060631009	ARB
Sacramento Valley Air Basin	Colusa-Sunrise Blvd.	060111002	2002 103 Grant
	Davis-UCD Campus	061130004	2002 103 Grant
	Roseville –N Sunrise Blvd	060610006	2002 103 Grant
	Sacramento-T Street	060670010	2002 103 Grant
	Willows-E Laurel Street	060210002	2002 103 Grant
	Yuba City-Almond Street	061010003	2002 103 Grant
South Coast Air Basin	Azusa	060370002	ARB
	Los Angeles-N Main Street	060371103	1999 103 Grant
	South Long Beach	060374004	ARB
Ventura County APCD	El Rio-Rio Mesa School #2	061113001	2002 103 Grant

B. Evaluation of FRM Sampling Frequencies

Federal regulations require the extensive use of filter-based FRM mass samplers. About two-thirds of the PM_{2.5} sites in California are required to sample on an everyday or every third day schedule using filter-based FRM samplers. Filter-based sampling is expensive in that field technicians are needed to collect the filter samples and laboratory services are required. The sampling frequency at many of the sites that sample more frequently than every sixth day could be reduced without unduly impacting programs that depend on the data. This is especially the case at sites that also have a continuous mass monitor.

Reducing the sampling frequency of some of the filter-based samplers could result in a substantial cost savings. By using some of the savings to purchase and deploy additional continuous mass monitors, air quality agencies could better support the needs to report the current air quality to the public and to forecast the near-future air quality. In the long run, continuous monitors are much less expensive to operate than a network of filter-based samplers. Also, continuous monitoring provides much more information to health scientists, air quality data analysts, and air quality modelers.

While existing federal regulations are currently an obstacle to reducing the sampling frequencies, the U.S. EPA is now in the process of revising their monitoring requirements. The revised regulations may allow for less frequent sampling in some cases. The U.S. EPA's draft timetable targets promulgation of the revised regulations in 2004. The revised regulations may also require fewer PM_{2.5} sites in California than are currently required.

As the draft regulations take on a more concrete form and approach promulgation, air quality agencies in California can develop plans for reducing the PM_{2.5} sampling frequency at some sites, and possibly reducing the number of PM_{2.5} monitoring sites. This may also be an opportunity for expanding the network of continuous PM_{2.5} mass monitors. Thus it may be appropriate for the ARB and the involved air districts to be planning in the next 12 months for changes to implement in 2004. By that time, several years of filter-based FRM data will be available. Also, a number of these FRM sites will have then collected a year or more of continuous mass monitoring data as well.

It should be noted that the U.S. EPA's package of regulatory revisions will not include provisions allowing continuous monitors to be used for regulatory comparisons to the standards. The U.S. EPA is working on other regulations that would allow continuous mass monitoring data to be used for regulatory comparisons to the standards.

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CHAPTER 4

DATA ANALYSIS, COMPLETENESS, AND DISTRIBUTION

A. Data Analysis

Data derived from the PM_{2.5} monitoring network include both aerosol mass measurements and chemically-resolved or speciated data. Mass measurements are used principally for identifying areas as attainment or nonattainment for the national PM_{2.5} standards. The mass data will also be useful for assessing trends in ambient PM_{2.5} concentrations. Speciated PM_{2.5} data will be used to assess trends and develop emission control measures aimed at reducing aerosol emissions as they relate to the SIP. This involves emission inventory and air quality model evaluation, source attribution analysis, and tracking the success of emission control programs.

To assess the spatial and temporal characteristics of PM_{2.5} concentrations throughout California, we analyzed monitoring data collected from 1999 through 2002. Specific objectives of the analysis were to evaluate the severity of PM_{2.5} exceedances by monitoring site throughout California and to determine the seasonal variation in PM_{2.5} mass in different air basins. Preliminary findings are summarized below.

1. PM_{2.5} FRM Summary Statistics

The majority of sites in California's PM_{2.5} mass monitoring network began sampling in early 1999 and have sufficient data for making some comparisons among the sites. The 1999 through 2002 data are summarized in Appendix C. The annual average and the indicator of data completeness that are included in Appendix C were both calculated according to the methods specified in 40 CFR Part 50, Appendix N.

The data show that the highest 24-hour PM_{2.5} mass concentrations vary widely throughout the State. Table 8 shows the range of highest PM_{2.5} concentrations for sites in California.

In general, both the highest 24-hour and annual average PM_{2.5} concentrations are found at sites in the South Coast Air Basin and San Joaquin Valley Air Basin. A number of sites in both these air basins have 24-hour and annual average concentrations that are above the levels of the national standards. Relatively high 24-hour and annual average measurements are also found in the San Diego Air Basin and in limited parts of the Sacramento Valley, San Francisco Bay Area, Salton Sea, and Mountain Counties Air Basins. Appendix C includes summaries of the PM_{2.5} data for 1999 through 2002.

Table 8
Range of Highest PM_{2.5} Concentrations for Sites in California
(Based on 1999 to 2002 Data)

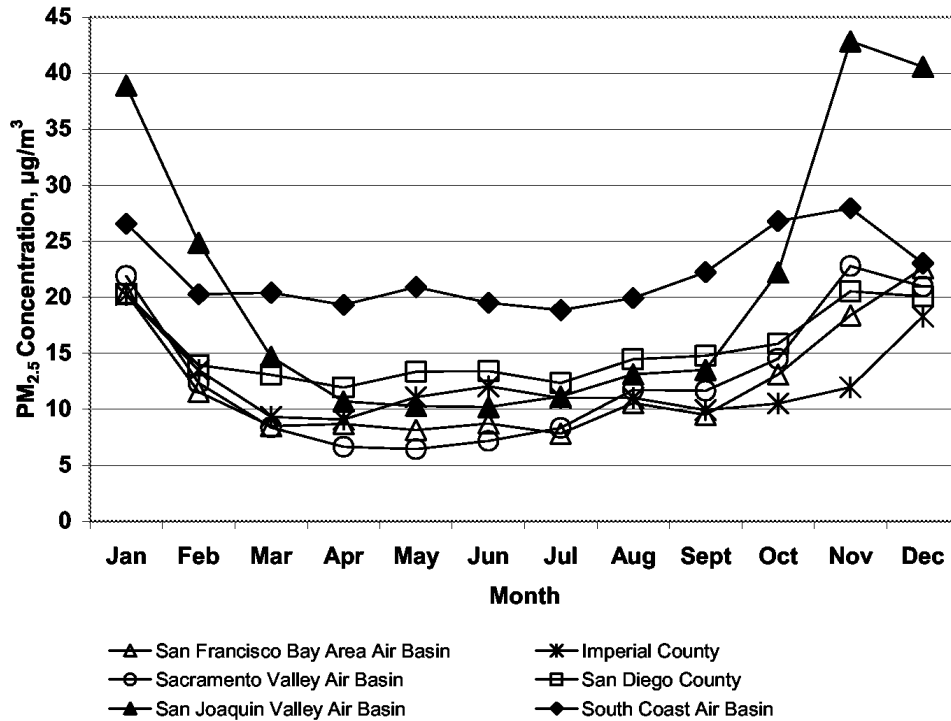
Averaging Time	Lowest		Highest	
	Site	Concentration	Site	Concentration
24-hour - Maximum	Echo Summit	10.0 µg/m ³	Fresno-1st Street	160 µg/m ³
Annual Average - Maximum	Echo Summit	3.8 µg/m ³	Bakersfield - 5558 California Avenue	31.2 µg/m ³

Typically, the highest 24-hour concentrations in most, but not all, of the State occur in November, December, and January, while the lowest concentrations occur between March and August. Most of the California air basins follow this seasonal pattern to some degree. The South Coast Air Basin is an exception to this. In the South Coast Air Basin, fairly high values occur throughout the year. This seasonality is illustrated for a number of air basins in Figure 6.

The seasonality is most pronounced in the San Joaquin Valley Air Basin, where the November-December-January concentrations were on the order of four to five times greater than those for March through August. The seasonality is also quite pronounced in the Sacramento Valley Air Basin and San Francisco Bay Area Air Basin, but less pronounced in the San Diego Air Basin, Imperial County, and Mountain Counties Air Basin. In other areas, the highest concentrations occurred throughout the year, or concentrations tended to be quite low throughout the year.

This contrast in PM concentrations is part of what makes the PM problem in California so difficult and complex. The emission sources can be very diverse from one area to another. Furthermore, because of the variety of sources and the size and chemical composition of the particles, both the nature and causes of the PM problem can vary considerably from area to area. As a result, even though two areas may have similar concentrations, they may have very different PM problems. To add to the complexity, a single area may have a different type of PM problem during different times of the year. The data collected from PM monitoring programs will help in making strides toward understanding and controlling the PM problem.

Figure 6
Monthly Average PM_{2.5} Concentrations by Area
(1999 – 2002)



2. Ambient Air Quality Standards for Particulate Matter

National Ambient Air Quality Standards apply to PM_{2.5} and PM₁₀ mass concentrations. The national PM standards specify the following limits:

- Twenty-four-hour average PM_{2.5} not to exceed 65 µg/m³ for a three-year average of annual 98th percentiles at any site in a monitoring area.
- Three-year average of annual arithmetic means of PM_{2.5} not to exceed 15 µg/m³ from a single site or the spatial average of eligible sites in a monitoring area.
- Twenty-four-hour average PM₁₀ not to exceed 150 µg/m³ more than once a year over a three-year period at any site in a monitoring area. This is calculated as an expected number of exceedances for sampling that is less than everyday.

- Three-year average of annual arithmetic means of PM₁₀ concentrations not to exceed 50 µg/m³ at any site in a monitoring area.

California has set its own State standards for PM_{2.5} and PM₁₀. The State standards, along with the State designation criteria, specify the following limits:

- Annual arithmetic average PM_{2.5} calculated as an average of quarterly averages, not to exceed 12 µg/m³ during a three year period at any site in a monitoring area.
- Twenty-four-hour average PM₁₀ not to exceed 50 µg/m³ during a three-year period at any site in a monitoring area, excluding exceedances affected by highly irregular or infrequent events.
- Annual arithmetic mean of PM₁₀ concentrations not to exceed 20 µg/m³ during a three-year period at any site in a monitoring area.

The first official national PM_{2.5} area designations will take place in the 2004-2005 timeframe, based on three full years of FRM data for PM_{2.5}. In addition, the U.S. EPA is conducting its periodic health review of the standards and expects to complete it in 2004. The designations will be updated annually as new information becomes available.

As PM_{2.5} data are collected, values exceeding the national 24-hour PM_{2.5} standard can be evaluated for influence by natural/exceptional events. The U.S. EPA has not published a natural/exceptional events policy for PM_{2.5}. However, Appendix N of the Code of Federal Regulations, Part 50, specifies that it may be appropriate for U.S. EPA to exclude data affected by uncontrollable or natural events for regulatory purposes, with a decision made on a case-by-case basis by the U.S. EPA Regional Administrator.

The ARB plans to bring a proposal of nonattainment area designations for the new State PM_{2.5} standard to its Board for consideration early in 2004.

B. Data Completeness Requirements

The primary objective of the PM_{2.5} FRM mass monitoring for the U.S. EPA is to identify areas where PM_{2.5} concentrations exceed one or both of the national PM_{2.5} standards. The nonattainment designation can have an economic impact on an area. The PM_{2.5} FRM data have to be of sufficient quality and quantity in order to make defensible attainment/nonattainment decisions. The goal of the network design and review process is to ensure that monitoring resources support collecting data of adequate quality and quantity. We are including this discussion to stress the importance of having complete data at each site and to highlight potential problems that may arise when comparing data to the standards. As shown in Appendix C, a number of sites in California do not have complete data for some of the last three calendar years.

For the purposes of making comparisons with either the national annual or 24-hour standards at a monitoring site, three years of representative monitoring data with 75 percent of the scheduled PM_{2.5} samples per quarter are required (U.S. EPA, 1997a). This requirement can be quite difficult to accomplish with a one in six day sampling schedule. A monitoring site on a one in six day sampling schedule could fail the annual data completeness test by missing only 4 samples in a quarter (or less than 7 percent of the expected number of samples in a year), even if the remaining quarters have 100 percent valid data. Certain exceptions to the basic requirement for data completeness are allowed and will depend on whether you want to demonstrate that a site meets or fails a standard.

To demonstrate that a site meets either the national annual or 24-hour standards, the Regional Administrator may approve using less complete data than 75 percent of the expected data for each quarter (U.S. EPA, 1999b). The Regional Administrator can consider filling in for missing scheduled sampling days for a monitoring site, if the following conditions are met:

- Have at least 50 percent of the scheduled number of samples for each quarter for all three years.
- Show that the emissions and meteorology for the substitute quarters compare to the emissions and meteorology for the quarters in question.
- Meet the standards based on the incomplete data.

Missing data may be replaced by using one of the following approaches:

- Replacing missing data with collocated PM_{2.5}, PM₁₀, or TSP data from the same or the nearest day (within two days before or after the scheduled sampling day). When using collocated data, you must substitute for all missing scheduled sampling days where collocated data are available, not just for selected days in that quarter.
- Replacing missing data with the maximum PM_{2.5} data value from the same site across all three years for the same quarter.

There are less stringent data requirements for showing that a monitor failed an attainment test. For the 24-hour standard, years containing quarters with less than 75 percent data completeness shall be included in the computation if the annual 98th percentile value is greater than the level of the standard. This applies even if there was only one measurement in a year and that single measurement exceeded the standard. In that case, a site expected to sample everyday could be designated nonattainment for the 24-hour standard based on one sample in a year.

To demonstrate a violation of the annual PM_{2.5} standard, years containing quarters with at least 11 samples shall be included in the computation if the resulting annual mean concentration is greater than the level of the standard.

For a site expected to sample everyday, only 44 samples (or about 12 percent) are required to demonstrate that a site violates the annual standard. In some special circumstances, the Regional Administrator may authorize using years containing quarters with less than 11 samples in a quarter.

Our goal is to collect data as complete as possible. Appendix C includes information on data completeness at each monitoring site in the California PM_{2.5} network. The information presented in the table includes the total number of 24-hour measurements collected at the site during the year, the number of months and quarters that include at least one measurement, and an indication of the validity of the annual average value for the year. In Appendix C, we used the convention that a year that meets one of the following conditions is considered valid for calculating annual average concentrations:

- A minimum of 75 percent of the scheduled PM_{2.5} samples per quarter were collected, or
- At least 11 samples per quarter were collected and the resulting annual mean concentration is greater than the level of the standard.

C. Data Distribution

Data collected as part of the PM_{2.5} network are available from the U.S. EPA Aerometric Information and Retrieval System (AIRS) and the ARB air quality database, the Aerometric Data and Analysis Management (ADAM) system. The ARB has a very effective, customer oriented data distribution system that includes the following elements:

- **ARB Air Quality Web Site** (<http://www.arb.ca.gov/aqd/aqd.htm>) provides public access to ambient air quality data, maps of areas that violate the national and State standards, plans for PM_{2.5} monitoring, and electronic versions of several of the reports described below.
- **Interactive data queries** of the entire California database are available from the Web site above or more directly at <http://www.arb.ca.gov/adam>. The user can query: 1) air quality trends for air basins and sites for ozone and PM₁₀, 2) the top 4 values and the number of days above the standards for ozone, PM_{2.5}, PM₁₀, dichot fine particles, CO, SO₂, and NO₂; 3) hourly data listings for a selected day for all gaseous pollutants; 4) 10 week summaries of daily maximum data and other daily statistics, and 5) air quality trends for ambient toxics compounds.
- **2003 CD-ROM** contains hourly, daily, and/or annual summary data during the 1980-2001 time period for ozone, CO, NO_x, NO, NO₂, SO₂, H₂S, THC, NMHC, CH₄, TSP, PM₁₀, PM_{2.5} FRM, dichot fine and coarse particles, COH, and b_{scat}, as well as speciated TSP, PM₁₀, dichot, and hydrocarbons. Toxics data for the 1990-2001 time period are also included on the CD-ROM, as well as a number of predefined annual reports which enable the user to quickly obtain key data.

- **2003 California Almanac of Emissions & Air** will soon be available. It will provide key ozone, PM_{2.5}, PM₁₀, and CO indicators (expected peak day concentration, design values, annual averages, and number of exceedances) for counties and air basins, from 1980 through 2001. A few indicators for NO₂ and SO₂ will also be included. The report will also include preliminary year 2002 ozone data. Air quality and health risk trends of ten toxic air contaminants from 1990 through 2001 will be included. An electronic version of all completed Almanacs is available at <http://www.arb.ca.gov/aqd/almanac/almanac.htm>. The web also provides access to a supplement with information that is helpful for interpreting air quality trends in this and previous Almanacs.
- **State and Local Air Monitoring Network Plan**, June 2002 (ARB, 2002), provides an inventory of current and historical air quality monitoring in California and Baja, Mexico, including PM_{2.5} monitoring at all sites. A summary of instrument types and chemical analysis methods for criteria pollutants and maps are also included. The electronic version of the report is available on the web at <http://www.arb.ca.gov/aqd/namlams/namlams.htm>.
- **Air Quality and Meteorological Information System (AQMIS)** provides real-time preliminary air quality and meteorological data. AQMIS currently reports 22 air quality and meteorological variables, including PM₁₀ and PM_{2.5}, and covers most of California's coast and Central Valley, with data collected from about 130 air quality sites and 250 meteorological sites. The data are continuous one-hour average measurements. The filter-based PM₁₀ and PM_{2.5} data are not included. The data are preliminary and not subject to any review or validation. AQMIS is primarily used for providing public information, supporting smoke management programs, and providing a strong foundation for air quality analysis and forecasts. AQMIS data are available on the web at <http://www.arb.ca.gov/airqualitytoday>.

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APPENDIX A

PM_{2.5} MASS MONITORING FOR COMPARISON TO THE STANDARDS

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Appendix A

PM_{2.5} Mass Monitoring for Comparison to the Standards

SQ Federal Reference Method (FRM) PM_{2.5} sequential sampler.
 Col SQ Collocated PM_{2.5} FRM sequential samplers.
 SCH PM_{2.5} FRM single-channel sampler.
 Col SCH Collocated PM_{2.5} FRM single-channel samplers.

Site Name (by MPA)	AIRS Site ID	Operating Agency*	Type of Monitor	Date of 1 st Valid Sample	Sampling Schedule	Supporting Lab
Bay Area AQMD						
Concord-2975 Treat Blvd	060130002	BA	Col SQ	3/19/99	Everyday (Oct-Mar) 1 in 6 day (Apr-Sep)	BA
Fremont-Chapel Way	060011001	BA	SQ	1/27/99	1 in 3 day (Oct-Mar) 1 in 6 day (Apr-Sep)	BA
Livermore-793 Rincon Avenue	060010007	BA	SQ	12/2/99	1 in 3 day (Oct-Mar) 1 in 6 day (Apr-Sep)	BA
Redwood City	060811001	BA	SQ	2/26/99	1 in 3 day (Oct-Mar) 1 in 6 day (Apr-Sep)	BA
San Francisco-Arkansas Street	060750005	BA	SQ	2/17/99	Everyday (Oct-Mar) 1 in 6 day (Apr-Sep)	BA
San Jose-Jackson ¹	060850005	BA	SQ	10/5/02	Everyday (Oct-Mar) 1 in 6 day (Apr-Sep)	BA
San Jose-Tully Road	060852003	BA	SQ	3/4/99	Everyday (Oct-Mar) 1 in 6 day (Apr-Sep)	BA
Santa Rosa-5 th Street	060970003	BA	SQ	1/24/99	1 in 3 day (Oct-Mar) 1 in 6 day (Apr-Sep)	BA
Vallejo-304 Tuolumne Street	060950004	BA	SQ	3/10/99	1 in 3 day (Oct-Mar) 1 in 6 day (Apr-Sep)	BA
Coachella Valley						
Indio-Jackson Street	060652002	SC	Col SQ	2/8/99	1 in 3 day	SC
Palm Springs-Fire Station	060655001	SC	SQ	1/1/00	1 in 3 day	SC
Great Basin Unified APCD						
Keeler-Cerro Gordo Road	060271003	GBU	Col SQ	1/3/99	1 in 3 day	GBU
Mammoth Lakes-Gateway HC	060510001	GBU	SQ	11/20/00	1 in 3 day	GBU
Imperial County APCD						
Brawley-Main Street	060250003	IMP	SQ	1/3/99	1 in 3 day	SD
Calexico-Ethel Street	060250005	ARB	Col SQ	1/3/99	1 in 3 day	SD
El Centro-9 th Street	060251003	IMP	SQ	1/3/99	1 in 3 day	SD
Lake County Air Basin						
Lakeport-Lakeport Blvd	060333001	LAK	SCH	1/6/99	1 in 6 day	LAK
Lake Tahoe Air Basin						
South Lake Tahoe-Sandy Way	060170011	ARB	SCH	1/12/99	1 in 6 day	ARB
Mojave Desert Air Basin						
Lancaster-43301 Division Street- ²	060379033	MD	SQ	1/3/99	1 in 3 day	MD
Mojave-923 Poole Street	060290011	ARB	SQ	1/3/99	1 in 3 day	SD
Ridgecrest-Las Flores Avenue	060290012	KER	SQ	6/26/99	1 in 3 day	SD
Victorville-Armagosa Road	060710014	MD	Col SQ	1/3/99	1 in 3 day	MD

¹ San Jose-Jackson Street has replaced the San Jose-4th Street site.

² Lancaster-43301 Division Street replaced the Lancaster-W Pondera Street site on 11/1/01.

Appendix A (continued)
PM_{2.5} Mass Monitoring for Comparison to the Standards

SQ Federal Reference Method (FRM) PM_{2.5} sequential sampler.

Col SQ Collocated PM_{2.5} FRM sequential samplers.

SCH PM_{2.5} FRM single-channel sampler.

Col SCH Collocated PM_{2.5} FRM single-channel samplers.

Site Name (by MPA)	AIRS Site ID	Operating Agency*	Type of Monitor	Date of 1 st Valid Sample	Sampling Schedule	Supporting Lab
Monterey Bay Unified APCD						
Salinas #3 ³	060531003	MBU	SQ	1/4/00	1 in 6 day	BA
Santa Cruz-2544 Soquel Avenue	060870007	MBU	SQ	2/23/99	1 in 6 day	BA
Mountain Counties Air Basin						
Grass Valley-Litton Building	060570005	NSI	SCH	1/6/99	1 in 6 day	ARB
Portola-161 Nevada Street ⁴	060631009	NSI	SQ	5/21/00	1 in 3 day	ARB
Quincy-N Church Street	060631006	NSI	SQ	3/28/99	1 in 3 day	ARB
San Andreas-Gold Strike Road	060090001	ARB	SCH	1/6/99	1 in 6 day	ARB
Truckee-Fire Station	060571001	NSI	Col SQ	3/31/99	1 in 3 day	ARB
North Coast Air Basin						
Eureka-Health Dept 6 th and I Street	060231002	NCU	SCH	1/8/99	1 in 6 day	BA
Ukiah-County Library	060450006	MEN	SCH	1/7/99	1 in 6 day	LAK
Northeast Plateau Air Basin						
Alturas-W 4 th Street	060490001	SIS	SCH	1/18/99	1 in 6 day	ARB
Sacramento Valley Air Basin						
Chico-Manzanita Avenue	060070002	ARB	SCH	12/19/98	1 in 6 day	ARB
Colusa-Sunrise Blvd	060111002	ARB	SQ	12/16/98	1 in 3 day	ARB
Redding-Health Dept Roof	060890004	SHA	SCH	12/19/98	1 in 6 day	ARB
Roseville-N Sunrise Blvd	060610006	ARB	SCH	12/31/98	1 in 6 day	ARB
Sacramento-Del Paso Manor	060670006	SAC	Col SQ	1/3/99	Everyday (Oct-Mar) 1 in 3 day (Apr-Sep)	ARB
Sacramento-Health Dept Stockton Blvd	060674001	SAC	SQ	2/2/99	Everyday (Oct-Mar) 1 in 3 day (Apr-Sep)	ARB
Sacramento-T Street	060670010	ARB	SQ	12/13/98	Everyday	ARB
Woodland-Gibson Road	061131003	YS	SQ	1/9/99	1 in 3 day	ARB
Yuba City-Almond Street	061010003	ARB	Col SCH	12/19/98	1 in 6 day	ARB
San Diego County APCD						
Chula Vista	060730001	SD	SQ	1/3/99	1 in 3 day	SD
El Cajon-Redwood Avenue	060730003	SD	SQ	1/1/99	Everyday	SD
Escondido-E Valley Parkway	060731002	SD	SQ	1/1/99	Everyday	SD
San Diego-12 th Avenue	060731007	SD	SQ	1/1/99	Everyday	SD
San Diego-Overland Avenue	060730006	SD	Col SQ	1/3/99	1 in 3 day	SD

³ Salinas #3 replaced Salinas-Natividad Road #2, which operated from 2/17/99 through 2/28/00.

⁴ Portola-161 Nevada Street replaced Portola-Commercial Street, which operated from 3/28/99 through 2/9/00.

Appendix A (continued)

PM_{2.5} Mass Monitoring for Comparison to the Standards

SQ Federal Reference Method (FRM) PM_{2.5} sequential sampler.

Col SQ Collocated PM_{2.5} FRM sequential samplers.

SCH PM_{2.5} FRM single-channel sampler.

Col SCH Collocated PM_{2.5} FRM single-channel samplers.

Site Name (by MPA)	AIRS Site ID	Operating Agency*	Type of Monitor	Date of 1 st Valid Sample	Sampling Schedule	Supporting Lab
San Joaquin Valley Unified APCD						
Bakersfield-5558 California Avenue	060290014	ARB	Col SQ	1/3/99	Everyday	VEN
Bakersfield-1120 Golden State Highway	060290010	SJV	SQ	1/3/99	1 in 3 day (Oct-Mar) 1 in 6 day (Apr-Sep)	VEN
Bakersfield-410 E Planz Road	060290016	ARB	SQ	2/18/00	1 in 3 day	VEN
Clovis-N Villa Avenue	060195001	SJV	SQ	1/3/99	1 in 3 day (Oct-Mar) 1 in 6 day (Apr-Sep)	VEN
Corcoran-Patterson Avenue	060310004	SJV	SQ	1/3/99	1 in 3 day (Oct-Mar) 1 in 6 day (Apr-Sep)	VEN
Fresno-1 st Street	060190008	ARB	Col SQ	1/3/99	Everyday	ARB
Fresno-Hamilton & Winery	060195025	SJV	SQ	1/13/00	1 in 3 day (Oct-Mar) 1 in 6 day (Apr-Sep)	VEN
Merced-M Street	060472510	SJV	SQ	4/12/99	1 in 3 day (Oct-Mar) 1 in 6 day (Apr-Sep)	VEN
Modesto-814 14th Street	060990005	ARB	SQ	1/3/99	1 in 3 day	ARB
Stockton-Hazelton Street	060771002	ARB	SQ	1/3/99	1 in 3 day	ARB
Visalia-N Church Street	061072002	ARB	SQ	1/3/99	1 in 3 day	ARB
San Luis Obispo County APCD						
Atascadero-Lewis Avenue	060798001	SLO	Col SCH	1/6/99	1 in 6 day	VEN
San Luis Obispo-Marsh Street	060792002	ARB	SCH	1/6/99	1 in 6 day	VEN
Santa Barbara County APCD						
Santa Barbara area ⁵		ARB	SCH		1 in 6 day	VEN
Santa Maria-Broadway	060831007	ARB	SCH	8/16/99	1 in 6 day	VEN
South Coast Air Basin						
Anaheim ⁶	060590002	SC	SQ	9/4/01	Everyday	SC
Azusa	060370002	SC	SQ	1/4/99	Everyday	SC
Big Bear City-501 W Valley Blvd	060718001	SC	SQ	2/8/99	1 in 6 day	SC
Burbank-W Palm Avenue	060371002	SC	SQ	1/21/99	1 in 3 day	SC
Fontana-Arrow Highway	060712002	SC	SQ	1/3/99	1 in 3 day	SC
Los Angeles-North Main Street	060371103	SC	Col SQ	1/22/99	Everyday	SC
Lynwood	060371301	SC	SQ	1/3/99	1 in 3 day	SC
Mission Viejo-26081 Via Pera	060592022	SC	SQ	6/17/99	1 in 3 day	SC
North Long Beach ⁷	060374002	SC	SQ	1/3/99	Everyday	SC
Ontario-1408 Francis Street	060710025	SC	SQ	1/3/99	1 in 3 day	SC
Pasadena-S Wilson Avenue	060372005	SC	SQ	3/4/99	1 in 3 day	SC
Pico Rivera	060371601	SC	SQ	1/15/99	1 in 3 day	SC
Reseda	060371201	SC	SQ	1/24/99	1 in 3 day	SC
Riverside-Magnolia	060651003	SC	SQ	1/6/99	1 in 3 day	SC
Riverside-Rubidoux	060658001	SC	Col SQ	1/3/99	Everyday	SC
San Bernardino-4 th Street	060719004	SC	SQ	1/3/99	1 in 3 day	SC

⁵ The ARB plans to relocate the Santa Barbara-West Carillo site to a new site in late 2002.

⁶ The South Coast AQMD relocated the Anaheim-Harbor Blvd site to a new site in the Anaheim area.

⁷ The South Coast AQMD plans to move the PM_{2.5} FRM sampler from the North Long Beach site to a new site in the South Long Beach area, because special particulate studies conducted recently indicate that area better represents the expected maximum concentrations experienced in the greater Long Beach area.

Appendix A (continued)
PM_{2.5} Mass Monitoring for Comparison to the Standards

SQ Federal Reference Method (FRM) PM_{2.5} sequential sampler.
 Col SQ Collocated PM_{2.5} FRM sequential samplers.
 SCH PM_{2.5} FRM single-channel sampler.
 Col SCH Collocated PM_{2.5} FRM single-channel samplers.

Site Name (by MPA)	AIRS Site ID	Operating Agency*	Type of Monitor	Date of 1 st Valid Sample	Sampling Schedule	Supporting Lab
Ventura County APCD						
El Rio-Rio Mesa School #2	061113001	VEN	SQ	1/9/99	1 in 3 day	VEN
Piru-Pacific Avenue	061110009	VEN	SQ	11/23/00	1 in 3 day	VEN
Simi Valley-Cochran Street	061112002	VEN	SQ	1/3/99	1 in 3 day	VEN
Thousand Oaks-Moorpark Road	061110007	VEN	Col SQ	1/3/99	1 in 3 day	VEN

***Key to Operating Agency Codes:**

ARB	Air Resources Board
BA	Bay Area Air Quality Management District
GBU	Great Basin Valleys Unified Air Pollution Control District
IMP	Imperial County Air Pollution Control District
KER	Kern County Air Pollution Control District
LAK	Lake County Air Quality Management District
MBU	Monterey Bay Unified Air Pollution Control District
MD	Mojave Desert Air Quality Management District
MEN	Mendocino County Air Quality Management District
NCU	North Coast Unified Air Quality Management District
NSI	Northern Sierra Air Quality Management District
SAC	Sacramento Metropolitan Air Quality Management District
SC	South Coast Air Quality Management District
SD	San Diego County Air Pollution Control District
SHA	Shasta County Air Quality Management District
SIS	Siskiyou County Air Pollution Control District
SJV	San Joaquin Valley Unified Air Pollution Control District
SLO	San Luis Obispo County Air Pollution Control District
VEN	Ventura County Air Pollution Control District
YS	Yolo-Solano County Air Quality Management District

APPENDIX B

EXISTING AND PLANNED $PM_{2.5}$ MONITORING NETWORK IN CALIFORNIA

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Appendix B

Existing and Planned PM_{2.5} Monitoring Network in California

FRM: Federal Reference Method (FRM) PM_{2.5} sequential or single-channel mass sampler.

CMM: PM_{2.5} continuous mass monitor. Most, if not all, of these are beta-attenuation monitors (BAMs).

Speciation: 24-hour (filter-based) and 1-Hour (continuous) speciation monitors. All 1-hour speciation monitors are planned. Most of the 24-hour speciation monitors are Spiral Aerosol Speciation Samplers (SASS).

Bold: Monitor is designated a National Air Monitoring Station (NAMS) monitor.

Site Name (by MPA)	AIRS Site ID	Operating Agency*	Mass		Speciation		
			FRM	CMM	24-Hour	Continuous	
Bay Area AQMD							
Concord-2975 Treat Blvd	060130002	BA	Deployed (Collocated)				
Fremont-Chapel Way	060011001	BA	Deployed				
Livermore-793 Rincon Avenue	060010007	BA	Deployed	Deployed			
Oakland-Filbert	060010008	BA		Deployed			
Point Reyes	060410003	ARB		Deployed			
Redwood City	060811001	BA	Deployed				
San Francisco-Arkansas Street	060750005	BA	Deployed	Deployed			
San Jose-Jackson ¹	060850004	BA	Deployed	Deployed	Deployed	Aethelometer	
San Jose-Tully Road	060852003	BA	Deployed				
Santa Rosa-5 th Street	060970003	BA	Deployed				
Vallejo-304 Tuolumne Street	060950004	BA	Deployed				
Coachella Valley							
Indio-Jackson Street	060652002	SC	Deployed (Collocated)	Deployed			
Palm Springs-Fire Station	060655001	SC	Deployed	Deployed			
Great Basin Unified APCD							
Keeler-Cerro Gordo Road	060271003	GBU	Deployed (Collocated)				
Mammoth Lakes-Gateway HC ²	060510001	GBU	Deployed ²				
Imperial County APCD							
Brawley-Main Street	060250003	IMP	Deployed				
Calexico-East	060250006	ARB		Deployed			
Calexico-Ethel Street	060250005	ARB	Deployed (Collocated)	Deployed (Collocated)	Deployed		
El Centro-9 th Street	060251003	IMP	Deployed				
Lake County Air Basin							
Lakeport-Lakeport Blvd	060333001	LAK	Deployed				

¹ The Bay area AQMD has relocated the San Jose-4th Street site to a new site named San Jose-Jackson Street.

² Mammoth Lakes, Quincy, and Portola are all potentially smoke-impacted and we have proposed that one should be designated as a NAMS. Before a decision can be made, the involved agencies will need to coordinate on this, and more data will be needed from the recently opened Mammoth Lakes site

Appendix B (continued)
Existing and Planned PM_{2.5} Monitoring Network in California

FRM: Federal Reference Method (FRM) PM_{2.5} sequential or single-channel mass sampler.
 CMM: PM_{2.5} continuous mass monitor. Most, if not all, of these are beta-attenuation monitors (BAMs).
 Speciation: 24-hour (filter-based) and 1-Hour (continuous) speciation monitors. All 1-hour speciation monitors are planned. Most of the 24-hour speciation monitors are Spiral Aerosol Speciation Samplers (SASS).
Bold: Monitor is designated a National Air Monitoring Station (NAMS) monitor.

Site Name (by MPA)		AIRS Site ID	Operating Agency*	Mass		Speciation	
				FRM	CMM	24-Hour	Continuous
Lake Tahoe Air Basin							
	South Lake Tahoe-Sandy Way	060170011	ARB	Deployed	Deployed		
Mojave Desert Air Basin							
	Lancaster-43301 Division Street ³	060379033	MD	Deployed			
	Mojave-923 Poole Street	060290011	ARB	Deployed			
	Ridgecrest-Las Flores Avenue	060290012	KER	Deployed			
	Victorville-Armagosa Road	060710014	MD	Deployed (Collocated)			
Monterey Bay Unified APCD							
	Salinas #3	060531003	MBU	Deployed	Deployed		
	Santa Cruz-2544 Soquel Avenue	060870007	MBU	Deployed	Deployed		
Mountain Counties Air Basin							
	Grass Valley-Litton Building	060570005	NSI	Deployed			
	Portola-161 Nevada Street ²	060631009	NSI	Deployed ²	Planned	Deployed	
	Quincy-N Church Street ²	060631006	NSI	Deployed ²			
	San Andreas-Gold Strike Road	060090001	ARB	Deployed			
	Truckee-Fire Station	060571001	NSI	Deployed (Collocated)			
	Yosemite Village	060431001			Deployed		
North Coast Air Basin							
	Eureka-Health Dept 6 th and I Street	060231002	NCU	Deployed			
	Ukiah-County Library	060450006	MEN	Deployed			
Northeast Plateau Air Basin							
	Alturas-W 4 th Street	060490001	SIS	Deployed			

³ Lancaster-43301 Division Street replaced the Lancaster-W Pondera Street site on 11/1/01.

Appendix B (continued)
Existing and Planned PM_{2.5} Monitoring Network in California

FRM: Federal Reference Method (FRM) PM_{2.5} sequential or single-channel mass sampler.
CMM: PM_{2.5} continuous mass monitor. Most, if not all, of these are beta-attenuation monitors (BAMs).
Speciation: 24-hour (filter-based) and 1-Hour (continuous) speciation monitors. All 1-hour speciation monitors are planned. Most of the 24-hour speciation monitors are Spiral Aerosol Speciation Samplers (SASS).
Bold: Monitor is designated a National Air Monitoring Station (NAMS) monitor.

Site Name (by MPA)	AIRS Site ID	Operating Agency*	Mass		Speciation		
			FRM	CMM	24-Hour	Continuous	
Sacramento Valley Air Basin							
Chico-Manzanita Avenue	060070002	ARB	Deployed	Deployed (Collocated)	Deployed		
Colusa-Sunrise Blvd	060111002	ARB	Deployed	Planned			
Davis-UCD Campus	061130004	ARB		Planned			
Elk Grove-Bruceville Road	060670011	SAC		Deployed			
Folsom-Natoma Street	060670012	SAC		Deployed			
Gridley	060074001	ARB		Deployed			
Redding-Health Dept Roof	060890004	SHA	Deployed				
Roseville-N Sunrise Blvd	060610006	ARB	Deployed	Planned			
Sacramento-Del Paso Manor	060670006	SAC	Deployed (Collocated)	Deployed	Deployed	Aethelometer	
Sacramento-Health Dept Stockton Blvd	060674001	SAC	Deployed				
Sacramento-T Street	060670010	ARB	Deployed	Planned	Deployed		
Willows-E Laurel Street	060210002	ARB		Planned			
Woodland-Gibson Road	061131003	YS	Deployed				
Yuba City-Almond Street	061010003	ARB	Deployed (Collocated)	Planned			
San Diego County APCD							
Chula Vista	060730001	SD	Deployed				
El Cajon-Redwood Avenue	060730003	SD	Deployed		Deployed		
Escondido-E Valley Parkway	060731002	SD	Deployed	Deployed	Deployed		
Otay Mesa-Paseo International	060732007	SD		Deployed			
San Diego-12 th Avenue	060731007	SD	Deployed	Deployed			
San Diego-Overland Avenue	060730006	SD	Deployed (Collocated)				

Appendix B (continued)

Existing and Planned PM_{2.5} Monitoring Network in California

FRM: Federal Reference Method (FRM) PM_{2.5} sequential or single-channel mass sampler.

CMM: PM_{2.5} continuous mass monitor. Most, if not all, of these are beta-attenuation monitors (BAMs).

Speciation: 24-hour (filter-based) and 1-Hour (continuous) speciation monitors. All 1-hour speciation monitors are planned. Most of the 24-hour speciation monitors are Spiral Aerosol Speciation Samplers (SASS).

Bold: Monitor is designated a National Air Monitoring Station (NAMS) monitor.

Site Name (by MPA)	AIRS Site ID	Operating Agency*	Mass		Speciation		
			FRM	CMM	24-Hour	Continuous	
San Joaquin Valley Unified APCD							
Bakersfield-5558 California Avenue	060290014	ARB	Deployed (Collocated)	Deployed (Collocated)	Deployed (Collocated)		
Bakersfield-1120 Golden State Highway	060290010	SJV	Deployed				
Bakersfield-410 E Planz Road	060290016	ARB	Deployed				
Clovis-N Villa Avenue	060195001	SJV	Deployed				
Corcoran-Patterson Avenue	060310004	SJV	Deployed	Deployed			
Fresno-1 st Street	060190008	ARB	Deployed	Deployed	Deployed	Aethelometer (2), Carbon, Nitrate (2), Sulfate	
Fresno-Hamilton & Winery	060192025	SJV	Deployed				
Merced-M Street	060472510	SJV	Deployed				
Modesto-814 14 th Street	060990005	ARB	Deployed	Deployed	Deployed		
Stockton-Hazelton Street	060771002	ARB	Deployed				
Tracy-24371 Patterson Pass Road	060773003	SJV		Deployed			
Visalia-N Church Street	061072002	ARB	Deployed	Deployed	Deployed		
San Luis Obispo County APCD							
Atascadero-Lewis Avenue	060798001	SLO	Deployed (Collocated)				
San Luis Obispo-Marsh Street	060792002	ARB	Deployed				
Santa Barbara County APCD							
Santa Barbara area ⁴		ARB	Deployed ⁴				
Santa Maria-Broadway	060831007	ARB	Deployed				

⁴ The ARB plans to relocate the Santa Barbara-West Carillo site to a new site in late 2002.

Appendix B (continued)

Existing and Planned PM_{2.5} Monitoring Network in California

FRM: Federal Reference Method (FRM) PM_{2.5} sequential or single-channel mass sampler.

CMM: PM_{2.5} continuous mass monitor. Most, if not all, of these are beta-attenuation monitors (BAMs).

Speciation: 24-hour (filter-based) and 1-Hour (continuous) speciation monitors. All 1-hour speciation monitors are planned. Most of the 24-hour speciation monitors are Spiral Aerosol Speciation Samplers (SASS).

Bold: Monitor is designated a National Air Monitoring Station (NAMS) monitor.

Site Name (by MPA)	AIRS Site ID	Operating Agency*	Mass		Speciation		
			FRM	CMM	24-Hour	Continuous	
South Coast Air Basin							
Anaheim ⁵	060590002	SC	Deployed	Deployed	Deployed ⁶		
Azusa	060370002	SC	Deployed (Collocated)	Deployed			
Banning-Airport	060650012	SC		Deployed			
Big Bear City-501 W Valley Blvd	060718001	SC	Deployed				
Burbank-W Palm Avenue	060371002	SC	Deployed	Deployed			
Fontana-Arrow Highway	060712002	SC	Deployed		Deployed ⁶		
Los Angeles-North Main Street	060371103	SC	Deployed (Collocated)	Deployed	Deployed (Collocated) ⁶		
Lynwood	060371301	SC	Deployed				
Mission Viejo-26081 Via Pera	060592022	SC	Deployed				
North Long Beach ⁷	060374002	SC	Deployed ⁷				
Ontario-1408 Francis Street	060710025	SC	Deployed				
Pasadena-S Wilson Avenue	060372005	SC	Deployed				
Pico Rivera	060371601	SC	Deployed				
Reseda	060371201	SC	Deployed				
Riverside-Magnolia	060651003	SC	Deployed				
Riverside-Rubidoux	060658001	SC	Deployed (Collocated)	Deployed (Collocated)	Deployed (Collocated) ⁶		
San Bernardino-4 th Street	060719004	SC	Deployed				
South Long Beach	060374004	SC	Planned ⁶	Planned ⁶			
Ventura County APCD							
El Rio-Rio Mesa School #2	061113001	VEN	Deployed	Planned			
Piru-Pacific Avenue	061110009	VEN	Deployed				
San Nicolas Island				Deployed			
Simi Valley-Cochran Street	061112002	VEN	Deployed	Deployed	Deployed		
Thousand Oaks-Moorpark Road	061110007	VEN	Deployed (Collocated)				

⁵ The South Coast AQMD has relocated the Anaheim-Harbor Blvd site to a new site in the Anaheim area.

⁶ The speciation network in the South Coast AQMD will include two types of filter-based speciation samplers, TEP samplers and SASS samplers. Two sites, Los Angeles-North Main Street and Riverside-Rubidoux, will operate TEP and SASS samplers in parallel. These two sites also have collocated SASS samplers. The Anaheim and Fontana-Arrow Highway sites have TEP samplers only.

⁷ The South Coast AQMD plans to move the PM_{2.5} FRM sampler from the North Long Beach site to a new site in the South Long Beach area, because special particulate studies conducted recently indicate that area better represents the expected maximum concentrations experienced in the greater Long Beach area.

Appendix B (continued)
Existing and Planned PM_{2.5} Monitoring Network in California

***Key to Operating Agency Codes:**

ARB	Air Resources Board
BA	Bay Area Air Quality Management District
GBV	Great Basin Valleys Unified Air Pollution Control District
IMP	Imperial County Air Pollution Control District
IMPROVE	IMPROVE Steering Committee
KER	Kern County Air Pollution Control District
LAK	Lake County Air Quality Management District
MBU	Monterey Bay Unified Air Pollution Control District
MD	Mojave Desert Air Quality Management District
MEN	Mendocino County Air Quality Management District
NCU	North Coast Unified Air Quality Management District
NSI	Northern Sierra Air Quality Management District
SAC	Sacramento Metropolitan Air Quality Management District
SC	South Coast Air Quality Management District
SD	San Diego County Air Pollution Control District
SHA	Shasta County Air Quality Management District
SIS	Siskiyou County Air Pollution Control District
SJV	San Joaquin Valley Unified Air Pollution Control District
SLO	San Luis Obispo County Air Pollution Control District
VEN	Ventura County Air Pollution Control District
YS	Yolo-Solano County Air Quality Management District

APPENDIX C

SUMMARY OF PM_{2.5} MASS DATA COLLECTED

WITH FEDERAL REFERENCE METHOD SAMPLERS

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Appendix C
Summary of PM_{2.5} Mass Data Collected with Federal Reference Method Samplers
Based on AIRS Extraction Dated: 5/22/03

Monitoring Planning Area							
Site Name (AIRS Site ID)							
	Year	High 24-Hour Concentration µg/m ³	*Average of Quarters µg/m ³	*Valid? (Nat'l)	†Number of Months	†Number of Quarters	‡Number of Observations
Bay Area AQMD							
	Concord-2975 Treat Blvd (060130002) #Three-year average (2000-2002) = 11.3 µg/m ³						
	1999	56.6	12.0	No	10	4	110
	2000	52.6	10.9	Yes	12	4	191
	2001	68.2	10.2	Yes	12	4	195
	2002	76.7	12.8	Yes	12	4	193
	Fremont-Chapel Way (060011001) #Three-year average (2000-2002) = 11.7 µg/m ³						
	1999	56.5	13.9	No	12	4	76
	2000	44.8	10.6	Yes	12	4	89
	2001	56.8	12.2	Yes	12	4	94
	2002	48.0	12.5	Yes	12	4	95
	Livermore-793 Rincon Avenue (060010007) #Three-year average (2000-2002) = 12.3 µg/m ³						
	1999	63.1	28.0	No	1	1	9
	2000	56.4	11.2	Yes	12	4	86
	2001	107.5	11.9	Yes	12	4	92
	2002	61.6	13.8	Yes	12	4	96
	Redwood City (060811001) #Three-year average (2000-2002) = 11.2 µg/m ³						
	1999	59.7	12.1	No	11	4	68
	2000	44.0	10.9	Yes	12	4	82
	2001	67.9	11.3	Yes	12	4	91
	2002	43.0	11.5	Yes	12	4	100
	San Francisco-Arkansas Street (060750005)						
	1999	71.2	12.6	No	11	4	121
	2000	47.9	11.4	No	12	4	193
	2001	76.6	11.5	Yes	12	4	196
	2002	70.2	13.1	Yes	12	4	200
	San Jose-4 th Street (060850004)						
	1999	70.0	12.3	No	10	4	117
	2000	64.2	13.6	Yes	12	4	180
	2001	63.3	12.4	Yes	12	4	194
	2002	44.1	12.2	No	4	2	89
	San Jose-Tully Road (060852003)						
	1999	77.0	14.5	No	10	4	117
	2000	67.2	12.2	No	12	4	188
	2001	57.5	11.2	Yes	12	4	181
	2002	53.7	12.0	Yes	12	4	221
	Santa Rosa-5 th Street (060970003) #Three-year average (2000-2002) = 10.5 µg/m ³						
	1999	54.9	12.1	No	12	4	69
	2000	40.1	10.3	Yes	12	4	91
	2001	75.9	10.8	Yes	12	4	89
	2002	50.7	10.5	Yes	12	4	92

Appendix C (continued)
Summary of PM_{2.5} Mass Data Collected with Federal Reference Method Samplers
Based on AIRS Extraction Dated: 5/22/03

Monitoring Planning Area							
	Site Name (AIRS Site ID)						
	Year	High 24-Hour Concentration µg/m ³	*Average of Quarters µg/m ³	*Valid? (Nat'l)	†Number of Months	†Number of Quarters	‡Number of Observations
Bay Area AQMD (continued)							
	Vallejo-304 Tuolumne Street (060950004) #Three-year average (2000-2002) = 12.5 µg/m ³						
	1999	90.5	14.1	No	10	4	63
	2000	60.1	11.6	Yes	12	4	90
	2001	90.1	12.5	Yes	12	4	90
	2002	72.3	13.6	Yes	12	4	96
Coachella Valley							
	Indio-Jackson Street (060652002) #Three-year average (2000-2002) = 11.8 µg/m ³						
	1999	29.6	12.8	No	10	4	83
	2000	28.6	11.2	Yes	12	4	115
	2001	33.5	12.2	Yes	12	4	113
	2002	26.8	12.0	Yes	12	4	115
	Palm Springs-Fire Station (060655001) #Three-year average (2000-2002) = 10.1 µg/m ³						
	2000	28.5	9.6	Yes	12	4	120
	2001	44.7	10.7	Yes	12	4	107
	2002	42.3	10.0	Yes	12	4	119
Great Basin Unified APCD							
	Keeler-Cerro Gordo Road (060271003)						
	1999	40.7	7.2	No	10	4	69
	2000	68.0	9.6	No	8	3	72
	2001	76.0	5.5	Yes	12	4	116
	2002	68.0	8.7 ¹	Yes	12	4	105
	Mammoth Lakes-Gateway HC (060510001)						
	2000	31.0	18.0	No	2	1	13
	2001	41.0	10.3	No	8	4	47
Imperial County APCD							
	Brawley-Main Street (060250003)						
	1999	44.2	11.2	No	8	4	65
	2000	55.4	12.3	No	11	4	76
	2001	42.2	11.1	No	12	4	91
	2002	25.9	10.2	No	12	4	85
	Calexico-Ethel Street (060250005)						
	1999	51.6	15.2	Yes	12	4	106
	2000	84.2	16.9	Yes	12	4	113
	2001	60.2	14.9	No	12	4	101
	2002	46.5	15.1	Yes	12	4	115

¹ The average of quarters is from the Keeler-Cerro Gordo Road collocated monitor and is based on complete data that include 57 observations. The average of quarters for the primary monitor was 8.4 in 2002.

Appendix C (continued)
Summary of PM_{2.5} Mass Data Collected with Federal Reference Method Samplers
Based on AIRS Extraction Dated: 5/22/03

Monitoring Planning Area							
Site Name (AIRS Site ID)							
	Year	High 24-Hour Concentration µg/m ³	*Average of Quarters µg/m ³	*Valid? (Nat'l)	†Number of Months	‡Number of Quarters	§Number of Observations
Imperial County APCD (continued)							
El Centro-9 th Street (060251003)							
	1999	52.5	11.7	No	12	4	103
	2000	55.6	10.4	No	10	4	86
	2001	23.5	8.9	No	12	4	94
	2002	28.9	9.3	No	11	4	92
Lake County Air Basin							
Lakeport-Lakeport Blvd (060333001)							
	1999	14.5	4.4	No	12	4	47
	2000	9.4	4.0	No	12	4	28
	2001	15.1	4.2	No	12	4	60
	2002	74.7 ²	6.4	Yes	12	4	61
Lake Tahoe Air Basin							
Echo Summit (060170012)							
	2000	10	3.8	Yes	12	4	122
	2001	26	3.8	Yes	12	4	122
South Lake Tahoe-Sandy Way (060170011)							
	1999	21	8.3	Yes	12	4	59
	2000	23	7.8	Yes	12	4	59
	2001	31	8.2	Yes	12	4	62
	2002	27	7.7	No	11	4	55
Mojave Desert Air Basin							
Lancaster-43301 Division Street (060379033)							
	2001	29.0	8.8	No	2	1	18
	2002	24	10.4	Yes	12	4	107
Lancaster-W Pondera Street (060379002)							
	1999	47.6	11.2	Yes	12	4	113
	2000	36	10.5	Yes	12	4	113
	2001	35	10.5	No	10	4	98
Mojave-923 Poole Street (060290011)							
	1999	27.6	8.5	No	11	4	99
	2000	28.7	7.5	No	12	4	74
	2001	15.3	6.1	Yes	12	4	109
	2002	31.4	7.9	No	12	4	100
Ridgecrest-Las Flores Avenue (060290012)							
	1999	22.9	8.5	No	7	3	48
	2000	38.6	7.8	No	12	4	91
	2001	14.7	6.5	No	12	4	90
	2002	30.9	8.2	Yes	12	4	104

² Lake County AQMD may seek approval from the U.S. EPA for this high value to be declared an exceptional event.

Appendix C (continued)
Summary of PM_{2.5} Mass Data Collected with Federal Reference Method Samplers
Based on AIRS Extraction Dated: 5/22/03

Monitoring Planning Area							
Site Name (AIRS Site ID)							
	Year	High 24-Hour Concentration µg/m ³	*Average of Quarters µg/m ³	*Valid? (Nat'l)	†Number of Months	†Number of Quarters	‡Number of Observations
Mojave Desert Air Basin (continued)							
Victorville-Armagosa Road (060710014)							
	1999	25.4	11.9	Yes	12	4	114
Victorville-14306 Park Avenue (060710306)							
	2000	31	11.9	No	12	4	115
	2001	31	11.5	Yes	12	4	119
	2002	38	13.9	Yes	12	4	114
Monterey Bay Unified APCD							
Salinas #3 (060531003) #Three-year average (2000-2002) = 8.5 µg/m ³							
	2000	26.4	7.9	Yes	12	4	73
	2001	25.6	8.6	Yes	12	4	58
	2002	23.5	9.1	Yes	12	4	61
Salinas-Natividad Road #2 (060531002)							
	1999	30.8	9.8	No	11	4	102
Santa Cruz-2544 Soquel Avenue (060870007) #Three-year average (2000-2002) = 8.5 µg/m ³							
	1999	31.4	9.4	No	11	4	89
	2000	23.3	7.9	Yes	12	4	72
	2001	23.1	9.1	Yes	12	4	58
	2002	22.8	8.6	Yes	12	4	61
Mountain Counties Air Basin							
Grass Valley-Litton Building (060570005)							
	1999	31	7.6	No	12	4	52
	2000	27	6.2	No	12	4	45
	2001	25	5.7	No	12	4	49
	2002	23	6.3	No	12	4	50
Portola-161 Nevada Street (060631009)							
	2000	46	10.6	No	8	3	67
	2001	58	15.6	Yes	12	4	114
	2002	41	16.4	No	7	3	56
Portola-Commercial Street (060631008)							
	1999	70	11.7	No	7	3	46
Quincy-N Church Street (060631006)							
	1999	92	13.3	No	10	4	73
	2000	37	9.4	No	12	4	104
	2001	49	11.5	Yes	12	4	110
	2002	37	10.9	No	9	4	77
San Andreas-Gold Strike Road (060090001) #Three-year average (2000-2002) = 9.0 µg/m ³							
	1999	33	11.1	Yes	12	4	59
	2000	48	9.0	Yes	12	4	63
	2001	31	8.1	Yes	12	4	61
	2002	40	9.9	Yes	12	4	60

Appendix C (continued)
Summary of PM_{2.5} Mass Data Collected with Federal Reference Method Samplers
Based on AIRS Extraction Dated: 5/22/03

Monitoring Planning Area							
	Site Name (AIRS Site ID)						
	Year	High 24-Hour Concentration µg/m ³	*Average of Quarters µg/m ³	*Valid? (Nat'l)	†Number of Months	†Number of Quarters	‡Number of Observations
Mountain Counties Air Basin (continued)							
	Truckee-Fire Station (060571001) #Three-year average (2000-2002) = 8.5 µg/m ³						
	1999	50	9.0	No	8	4	46
	2000	23	8.8	Yes	12	4	111
	2001	120	9.4	Yes	12	4	110
	2002	18	7.5	Yes	12	4	117
North Coast Air Basin							
	Eureka-Health Dept 6 th and I Street (060231002) #Three-year average (2000-2002) = 8.8 µg/m ³						
	1999	36.9	9.1	Yes	12	4	59
	2000	24.0	9.1	Yes	12	4	58
	2001	32.6	9.4	Yes	12	4	58
	2002	23.7	7.9	Yes	12	4	59
	Ukiah-County Library (060450006)						
	1999	35.6	8.9	Yes	12	4	58
	2000	20.0	7.2	No	12	4	57
	2001	38.3	8.0	Yes	12	4	57
	2002	16.9	5.7	No	6	2	30
Northeast Plateau Air Basin							
	Alturas-W 4 th Street (060490001)						
	1999	40	7.9	Yes	12	4	56
	2000	38	8.5	Yes	12	4	58
	2001	35	7.6	No	12	4	47
Sacramento Valley Air Basin							
	Chico-Manzanita Avenue (060070002) #Three-year average (2000-2002) = 14.6 µg/m ³						
	1999	73	17.5	Yes	12	4	59
	2000	98	15.8	Yes	12	4	61
	2001	65	13.0	Yes	12	4	59
	2002	84	15.1	Yes	12	4	61
	Colusa-Sunrise Blvd (060111002)						
	1999	55	13.2	No	12	4	85
	2000	28	8.0	Yes	12	4	114
	2001	36	9.6	Yes	12	4	121
	2002	57	11.5	No	12	4	95
	Redding-Health Dept Roof (060890004)						
	1999	57	12.9	Yes	12	4	57
	2000	45	9.2	No	12	4	55
	2001	49	9.2	Yes	12	4	61
	2002	40	10.5	Yes	12	4	54

Appendix C (continued)
Summary of PM_{2.5} Mass Data Collected with Federal Reference Method Samplers
Based on AIRS Extraction Dated: 5/22/03

Monitoring Planning Area							
Site Name (AIRS Site ID)							
	Year	High 24-Hour Concentration µg/m ³	*Average of Quarters µg/m ³	*Valid? (Nat'l)	†Number of Months	†Number of Quarters	‡Number of Observations
Sacramento Valley Air Basin (continued)							
Roseville-N Sunrise Blvd (060610006)	#Three-year average (2000-2002) = 12.4 µg/m ³						
	1999	79	13.4	Yes	12	4	59
	2000	51	12.2	Yes	12	4	59
	2001	49	11.9	Yes	12	4	60
	2002	53	13.2	Yes	12	4	60
Sacramento-Del Paso Manor (060670006)							
	1999	86 ³	23.7	No	7	3	66
	2000	81 ³	11.3 ³	No	9 ³	3 ³	38 ³
	2001	38	8.9	No	8	3	71
	2002	77 ³	12.1	No	10	4	148
Sacramento-Health Dept Stockton Blvd (060674001)							
	1999	86	16.2	Yes	11	4	158
	2000	65	10.3	No	8	3	128
	2001	42	8.6	No	6	3	47
	2002	91	11.3	No	10	4	154
Sacramento-T Street (060670010)							
	1999	108	17.0	Yes	12	4	264
	2000	67	12.3	Yes	12	4	331
	2001	72	11.6	No	12	4	293
	2002	73	14.3	Yes	12	4	333
Woodland-Gibson Road (061131003)							
	1999	70	16.3	Yes	11	4	98
	2000	46	10.3	Yes	12	4	116
	2001	57	10.4	No	12	4	111
	2002	69	10.7	Yes	12	4	112
Yuba City-Almond Street (061010003)	#Three-year average (2000-2002) = 12.0 µg/m ³						
	1999	58 ⁴	15.9 ⁴	Yes ⁴	12 ⁴	4 ⁴	58 ⁴
	2000	44 ⁴	11.2 ⁴	Yes ⁴	12 ⁴	4 ⁴	60 ⁴
	2001	56	11.9	Yes	12	4	63
	2002	62 ⁴	13.1 ⁴	Yes ⁴	12 ⁴	4 ²	61 ²

³ All of the yearly statistics for 2000 and the high concentration for 1999 and 2002 are from the Sacramento-Del Paso Manor collocated monitor.

⁴ The yearly statistics for 1999, 2000, and 2002, except the high concentration for 2000 and 2002 are from the Yuba City-Almond Street collocated monitor. In 1999 and 2002, the primary monitor's data were incomplete and in 2000 the data were complete, but the concentrations and the number of observations were lower for the primary monitor than for the collocated monitor. The three-year average is also from the collocated monitor.

Appendix C (continued)
Summary of PM_{2.5} Mass Data Collected with Federal Reference Method Samplers
Based on AIRS Extraction Dated: 5/22/03

Monitoring Planning Area							
Site Name (AIRS Site ID)							
	Year	High 24-Hour Concentration µg/m ³	*Average of Quarters µg/m ³	*Valid? (Nat'l)	†Number of Months	†Number of Quarters	‡Number of Observations
San Diego County APCD							
Chula Vista (060730001)	#Three-year average (2000-2002) = 14.1 µg/m ³						
	1999	47.1	15.1	Yes	12	4	103
	2000	40.5	13.1	Yes	12	4	101
	2001	41.0	15.5	Yes	12	4	109
	2002	41.0	13.9	Yes	12	4	116
El Cajon-Redwood Avenue (060730003)	#Three-year average (2000-2002) = 16.2 µg/m ³						
	1999	47.0	16.4	Yes	12	4	321
	2000	65.5	15.7	Yes	12	4	292
	2001	46.7	17.7	Yes	12	4	325
	2002	39.3	15.4	Yes	12	4	325
Escondido-E Valley Parkway (060731002)	#Three-year average (2000-2002) = 16.4 µg/m ³						
	1999	64.3	18.0	Yes	12	4	255
	2000	65.9	15.8	Yes	12	4	305
	2001	60.0	17.5	Yes	12	4	326
	2002	53.6	16.0	Yes	12	4	315
San Diego-12 th Avenue (060731007)	#Three-year average (2000-2002) = 15.9 µg/m ³						
	1999	46.9	17.7	Yes	12	4	289
	2000	66.3	15.6	Yes	12	4	273
	2001	54.1	16.6	Yes	12	4	317
	2002	46.9	15.5	Yes	12	4	352
San Diego-Overland Avenue (060730006)							
	1999	43.4	14.1	No	12	4	85
	2000	48.5	12.4	Yes	12	4	101
	2001	37.9	13.5	Yes	12	4	113
	2002	36.5	13.0	No	12	4	109
San Joaquin Valley Unified APCD							
Bakersfield-5558 California Avenue (060290014)	#Three-year average (2000-2002) = 22.3 µg/m ³						
	1999	134.8 ⁵	31.2 ⁵	Yes	12	4	294 ⁵
	2000	112.7	23.0 ⁶	Yes	12	4	329
	2001	154.7	21.2	Yes	12	4	344
	2002	89.6	22.8	Yes	12	4	343

⁵ The high concentration and average of quarters for 1999 are from the Bakersfield-5558 California Avenue collocated monitor and are based on complete data that include 79 observations. The high concentration and the average of quarters for the primary monitor was 134.1 and 26.8, respectively.

⁶ The average of quarters for 2000 is from the Bakersfield-5558 California Avenue collocated monitor and is based on complete data that include 53 observations. The average of quarters for the primary monitor was 22.0 in 2000. The three-year average is also from the collocated monitor.

Appendix C (continued)
Summary of PM_{2.5} Mass Data Collected with Federal Reference Method Samplers
Based on AIRS Extraction Dated: 5/22/03

Monitoring Planning Area							
Site Name (AIRS Site ID)							
	Year	High 24-Hour Concentration µg/m ³	*Average of Quarters µg/m ³	*Valid? (Nat'l)	†Number of Months	†Number of Quarters	‡Number of Observations
San Joaquin Valley Unified APCD (continued)							
Bakersfield-1120 Golden State Highway (060290010) #Three-year average (2000-2002) = 22.8 µg/m ³							
	1999	133.9	26.2	Yes	12	4	84
	2000	108.1	22.6	Yes	12	4	91
	2001	120.4	21.8	Yes	12	4	84
	2002	85	24.1	Yes	12	4	91
Bakersfield-410 E Planz Road (060290016) #Three-year average (2000-2002) = 21.5 µg/m ³							
	2000	91.0	20.3	Yes	11	4	102
	2001	114.2	20.8	Yes	12	4	114
	2002	76.4	23.6	Yes	12	4	117
Clovis-N Villa Avenue (060195001) #Three-year average (2000-2002) = 18.0 µg/m ³							
	1999	97.7	19.8	Yes	12	4	82
	2000	75.1	16.3	Yes	12	4	70
	2001	85.6	18.0	Yes	12	4	83
	2002	73.1	16.2	Yes	12	4	86
Corcoran-Patterson Avenue (060310004) #Three-year average (2000-2002) = 19.0 µg/m ³							
	1999	53.1	14.3	No	8	3	44
	2000	76.0	16.4	Yes	11	4	67
	2001	123.2	19.2	Yes	12	4	80
	2002	90.8	21.5	Yes	12	4	83
Fresno-1 st Street (060190008)							
	1999	136	27.7	Yes	12	4	275
	2000	160	25.5	No	9	4	194
	2001	110	19.8	Yes	12	4	304
	2002	84	22.9 ⁷	Yes	12	4	319
Fresno-Hamilton & Winery (060195025) #Three-year average (2000-2002) = 19.4 µg/m ³							
	2000	83.5	18.4	Yes	12	4	77
	2001	88.2	18.6	Yes	12	4	85
	2002	73.9	21.3	Yes	12	4	91
Merced-M Street (060472510)							
	1999	108.7	22.6	No	9	3	53
	2000	86.1	16.6	No	12	4	81
	2001	80.3	14.4	No	11	4	69
	2002	66.1	18.8	Yes	12	4	89

⁷ The average of quarters for 2002 is from the Fresno-1st Street collocated monitor and is based on complete data that include 69 observations. The average of quarters for the primary monitor was 21.6 in 2000.

Appendix C (continued)
Summary of PM_{2.5} Mass Data Collected with Federal Reference Method Samplers
Based on AIRS Extraction Dated: 5/22/03

Monitoring Planning Area							
Site Name (AIRS Site ID)							
	Year	High 24-Hour Concentration µg/m ³	*Average of Quarters µg/m ³	*Valid? (Nat'l)	†Number of Months	†Number of Quarters	‡Number of Observations
San Joaquin Valley Unified APCD (continued)							
Modesto-814 14 th Street (060990005)	#Three-year average (2000-2002) = 17.6 µg/m ³						
	1999	108	24.9	Yes	12	4	117
	2000	77	18.7	Yes	12	4	122
	2001	95	15.6	Yes	12	4	124
	2002	83	18.7	Yes	12	4	125
Stockton-Hazelton Street (060771002)	#Three-year average (2000-2002) = 15.3 µg/m ³						
	1999	101	19.7	Yes	12	4	117
	2000	78	15.5	Yes	12	4	123
	2001	76	13.9	Yes	12	4	123
	2002	64	16.7	Yes	12	4	124
Visalia-N Church Street (061072002)	#Three-year average (2000-2002) = 23.2 µg/m ³						
	1999	123	27.6	Yes	12	4	117
	2000	105	23.9	Yes	12	4	115
	2001	97	22.5	Yes	12	4	95
	2002	76	23.2	Yes	12	4	121
San Luis Obispo County APCD							
Atascadero-Lewis Avenue (060798001)	#Three-year average (2000-2002) = 9.9 µg/m ³						
	1999	27.5 ⁸	9.6	Yes	12	4	57
	2000	52.7 ⁸	10.3	Yes	12	4	58
	2001	57.7 ⁸	10.1	Yes	12	4	58
	2002	28	9.3	Yes	12	4	60
San Luis Obispo-Marsh Street (060792002)							
	1999	20.0	8.2	Yes	12	4	54
	2000	28.2	8.3	No	12	4	55
	2001	25.5	9.3	No	11	4	54
	2002	20.1	8.4	No	11	4	52
Santa Barbara County APCD							
Santa Barbara-W Carillo Street (060830010)							
	1999	21.3	12.9	No	6	4	15
	2000	24.2	13.1	No	10	4	44
Santa Maria-Broadway (060831007)	#Three-year average (2000-2002) = 9.9 µg/m ³						
	1999	24.3	11.4	No	5	2	22
	2000	28.7	9.8	Yes	12	4	57
	2001	43.2	10.4	Yes	12	4	61
	2002	21.4	9.6	Yes	12	4	60

⁸ High concentration for 1999, 2000, and 2001 are from the Atascadero-Lewis Avenue collocated monitor. The high concentrations from the primary monitor were 27.2 in 1999, 50.9 in 2000, and 57.6 in 2001.

Appendix C (continued)
Summary of PM_{2.5} Mass Data Collected with Federal Reference Method Samplers
Based on AIRS Extraction Dated: 5/22/03

Monitoring Planning Area							
	Site Name (AIRS Site ID)						
	Year	High 24-Hour Concentration µg/m ³	*Average of Quarters µg/m ³	*Valid? (Nat'l)	†Number of Months	†Number of Quarters	‡Number of Observations
South Coast Air Basin							
	Anaheim-Harbor Blvd (060590001) #Three-year average (2000-2002) = 20.3 µg/m ³						
	1999	68.6	25.9	No	8	4	92
	2000	113.9	20.3	Yes	12	4	273
	2001	70.8	22.0	Yes	10	4	251
	2002	68.6	18.6	Yes	12	4	351
	Azusa (060370002) #Three-year average (2000-2002) = 20.9 µg/m ³						
	1999	81.3	25.0	Yes	12	4	144
	2000	92.5	20.2	Yes	12	4	333
	2001	79.7	21.7	Yes	12	4	308
	2002	72.4	21.0	Yes	12	4	328
	Big Bear City-501 W Valley Blvd (060718001)						
	1999	32.1	10.3	Yes	11	4	97
	2000	29.0	10.2	No	12	4	59
	2001	34.6	11.2	Yes	12	4	57
	2002	34.1	11.5	No	12	4	56
	Burbank-W Palm Avenue (060371002)						
	1999	79.4	22.9	Yes	12	4	106
	2000	84.4	21.2	No	9	4	70
	2001	94.7	24.8	Yes	12	4	117
	2002	63.0	24.0	Yes	12	4	122
	Fontana-Arrow Highway (060712002) #Three-year average (2000-2002) = 24.5 µg/m ³						
	1999	97.9	25.7	Yes	12	4	121
	2000	72.9	24.5	Yes	12	4	112
	2001	74.8	24.9	Yes	12	4	114
	2002	66.6	24.3	Yes	12	4	110
	Los Angeles-North Main Street (060371103) #Three-year average (2000-2002) = 22.3 µg/m ³						
	1999	69.3	23.0	Yes	12	4	136
	2000	87.8	21.9	Yes	12	4	334
	2001	73.4	22.9	Yes	12	4	322
	2002	66.3	22.1	Yes	12	4	324
	Lynwood (060371301) #Three-year average (2000-2002) = 23.6 µg/m ³						
	1999	67.7	24.3	Yes	12	4	110
	2000	82.1	23.0	Yes	12	4	121
	2001	73.1	24.5	Yes	12	4	116
	2002	64.0	23.3	Yes	12	4	122
	Mission Viejo-26081 Via Pera (060592022) #Three-year average (2000-2002) = 15.3 µg/m ³						
	1999	56.6	17.0	No	7	3	65
	2000	94.7	14.7	Yes	12	4	119
	2001	53.4	15.8	Yes	12	4	102
	2002	58.5	15.5	Yes	12	4	119

Appendix C (continued)
Summary of PM_{2.5} Mass Data Collected with Federal Reference Method Samplers
Based on AIRS Extraction Dated: 5/22/03

Monitoring Planning Area							
Site Name (AIRS Site ID)							
	Year	High 24-Hour Concentration µg/m ³	*Average of Quarters µg/m ³	*Valid? (Nat'l)	†Number of Months	†Number of Quarters	‡Number of Observations
South Coast Air Basin (continued)							
North Long Beach (060374002)	#Three-year average (2000-2002) = 20.1 µg/m ³						
	1999	66.9	20.7	Yes	12	4	148
	2000	81.5	19.6	Yes	12	4	304
	2001	72.9	21.2	Yes	12	4	317
	2002	62.7	19.5	Yes	12	4	356
Ontario-1408 Francis Street (060710025)	#Three-year average (2000-2002) = 25.3 µg/m ³						
	1999	85.8	25.4	Yes	12	4	96
	2000	73.4	24.1	Yes	12	4	111
	2001	71.2	26.5	Yes	12	4	113
	2002	64.8	25.4	Yes	12	4	111
Pasadena-S Wilson Avenue (060372005)	#Three-year average (2000-2002) = 20.2 µg/m ³						
	1999	73.0	19.9	No	10	4	95
	2000	66.3	19.4	Yes	12	4	110
	2001	78.1	20.9	Yes	12	4	110
	2002	57.8	20.3	Yes	12	4	121
Pico Rivera (060371601)	#Three-year average (2000-2002) = 20.2 µg/m ³						
	1999	85.6	25.7	Yes	12	4	111
	2000	89.5	24.0	Yes	12	4	116
	2001	77.3	28.1	No	10	4	112
	2002	61	24.0	Yes	12	4	118
Reseda (060371201)	#Three-year average (2000-2002) = 18.4 µg/m ³						
	1999	79.0	17.3	Yes	10	4	71
	2000	67.5	18.0	Yes	12	4	108
	2001	71.1	18.4	Yes	12	4	109
	2002	48.8	18.9	Yes	12	4	120
Riverside-Magnolia (060651003)	#Three-year average (2000-2002) = 26.8 µg/m ³						
	1999	89.9	26.7	Yes	12	4	110
	2000	79.3	25.3	Yes	12	4	111
	2001	74.9	28.2	Yes	12	4	106
	2002	75.5	27.1	Yes	12	4	115
Riverside-Rubidoux (060658001)	#Three-year average (2000-2002) = 28.9 µg/m ³						
	1999	111.2	31.0	Yes	12	4	151
	2000	119.6	28.3	Yes	12	4	304
	2001	98.0	31.0	Yes	12	4	325
	2002	77.6	27.4	Yes	12	4	325

Appendix C (continued)
Summary of PM_{2.5} Mass Data Collected with Federal Reference Method Samplers
Based on AIRS Extraction Dated: 5/22/03

Monitoring Planning Area							
Site Name (AIRS Site ID)							
	Year	High 24-Hour Concentration µg/m ³	*Average of Quarters µg/m ³	*Valid? (Nat'l)	†Number of Months	†Number of Quarters	‡Number of Observations
South Coast Air Basin (continued)							
	San Bernardino-4 th Street (060719004)		#Three-year average (2000-2002) = 25.9 µg/m ³				
	1999	121.4	25.6	Yes	12	4	104
	2000	89.8	25.9	Yes	12	4	92
	2001	78.5	26.1	Yes	12	4	111
	2002	82.1	25.8	Yes	12	4	117
Ventura County APCD							
	El Rio-Rio Mesa School #2 (061113001)						
	1999	36.7	12.2	No	12	4	92
	2000	45.7	13.0	No	12	4	106
	2001	41.1	13.1	Yes	12	4	116
	2002	29.4	13.0	Yes	12	4	114
	Piru-Pacific Avenue (061110009)						
	2000	37.6	10.7	No	2	1	13
	2001	37.2	13.0	No	12	4	102
	2002	30.7	12.1	Yes	12	4	117
	Simi Valley-Cochran Street (061112002)						
	1999	64.6	13.8	Yes	12	4	109
	2000	55.3	14.8	No	12	4	102
	2001	50.0	14.9	Yes	12	4	116
	2002	46.4	14.6	Yes	12	4	111
	Thousand Oaks-Moorpark Road (061110007)						
	1999	53.2	11.8	Yes	12	4	110
	2000	53.7	13.3	No	12	4	103
	2001	45.5	14.4	No	12	4	95
	2002	31.7	12.6	Yes	12	4	116

* *Average of Quarters* and *Valid?* are calculated according to the methods specified in 40 CFR Part 50, Appendix N. Typically, a year is complete, and the *Average of Quarters* is therefore valid, if 75% or more of the expected measurements are available in each quarter. Under certain circumstances, however, an *Average of Quarters* can be deemed valid with fewer measurements (see 40 CFR Part 50, Appendix N for details).

† *Number of Months* and *Number of Quarters* are the number of months and number of quarters, respectively, that include at least one measurement.

‡ *Number of Observations* is the total number of 24-hour measurements collected at the site during the year.

A *three-year average* of valid annual arithmetic means that exceeds 15µg/m³ is an exceedance of the national annual average PM_{2.5} standard. Not listed if all three years (2000-2002) are not valid.

APPENDIX D

ACRONYMS

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Appendix D Acronyms

ADAM	Aerometric Data Analysis and Management
AIRS	Aerometric Information Retrieval System
AQS	AIRS Air Quality Subsystem
APCD	Air Pollution Control District
APS	Aerodynamic Particle Sizer
AQMD	Air Quality Management District
AQMP	Air Quality Management Plan
ARB	Air Resources Board
BAM	Beta Attenuation Monitor
CADMP	California Acid Deposition Monitoring Program
CFR	Code of Federal Regulations
CRPAQS	California Regional PM ₁₀ /PM _{2.5} Air Quality Study
DGM	Dry gas meter
EC	Elemental carbon
FRM	Federal Reference Method
IMPROVE	Interagency Monitoring of Protected Visual Environments
MFM	Mass flow meter
MPA	Monitoring Planning Area
NAMS	National Air Monitoring Station
OC	Organic carbon
OEHHA	California Office of Environmental Health Hazard Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PAMS	Photochemical Assessment Monitoring Station
PM	Particulate Matter
PM₁₀	Particulate Matter (0 to 10 microns aerodynamic diameter)
PM_{2.5}	Particulate Matter (0 to 2.5 microns aerodynamic diameter)
PTEP	Particulate Technical Enhancement Program
QAPP	Quality Assurance Project Plan
R&P	Rupprecht & Patashnick

Appendix D (continued)
Acronyms

RAAS	Reference Ambient Air Sampler
SASS	Spiral Aerosol Speciation Sampler
SCCAPM	Southern California Center for Airborne Particulate Matter
SCPMS	Southern California PM Supersite
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Station
SMPS	Scanning Mobility Particle Sizer
SPM	Special Purpose Monitoring
SSI	Size-Selective Inlet
TEOM	Tapered Element Oscillating Microbalances
TEP	Technical Enhancement Program
U.S. EPA	United States Environmental Protection Agency
XRF	X-Ray Fluorescence

APPENDIX E

GLOSSARY

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Appendix E

Glossary

Aethelometer

An air monitoring instrument that generates hourly (and even every-five-minute) average measurements of black soot, which can be related to elemental carbon.

Air Basin

A land area with generally similar meteorological and geographic conditions throughout. To the extent possible, air basin boundaries are defined along political boundary lines and include both the source and receptor areas. California is currently divided into 15 air basins.

Air District

A political body responsible for managing air quality on a regional or county basis. California is currently divided into 35 air districts. (See also Air Pollution Control District and Air Quality Management District).

Air Monitoring

Sampling for and measuring of pollutants present in the atmosphere.

Air Pollutants

Amounts of foreign and/or natural substances occurring in the atmosphere that may result in adverse effects to humans, animals, vegetation, and/or materials.

Air Pollution Control District (APCD)

A county agency with authority to regulate stationary, indirect, and area sources of air pollution (e.g., power plants, highway construction, and housing developments) within a given county, and governed by a district air pollution control board composed of the elected county supervisors. (See also Air Quality Management District).

Air Quality Management District (AQMD)

A group of counties or portions of counties, or an individual county specified in law with authority to regulate stationary, indirect, and area sources of air pollution within the region and governed by a regional air pollution control board comprised mostly of elected officials from within the region. (See also Air Pollution Control District).

Air Quality Management Plan (AQMP)

A plan prepared by an APCD/AQMD, for a county or region designated as a nonattainment area, for the purpose of bringing the area into compliance with the requirements of the national and/or California ambient air quality standards. AQMPs are incorporated into the State Implementation Plan (SIP).

Ambient Air Quality Standards (AAQS)

Health- and welfare-based standards for outdoor air which identify the maximum acceptable average concentrations of air pollutants during a specified period of time. (See also California Ambient Air Quality Standard, National Ambient Air Quality Standard, and Criteria Air Pollutant.)

Appendix E (continued)

Glossary

Attainment Area

A geographical area identified to have air quality as good as, or better than, the national and/or California ambient air quality standards (NAAQS/ CAAQS). An area may be an attainment area for one pollutant and a nonattainment area for others.

California Air Resources Board (ARB)

The State's lead air quality agency consisting of an eleven-member board appointed by the Governor and several hundred employees. CARB is responsible for attainment and maintenance of the state and federal air quality standards, and is fully responsible for motor vehicle pollution control. It oversees county and regional air pollution management programs.

California Ambient Air Quality Standard (CAAQS)

A legal limit that specifies the maximum level and time of exposure in the outdoor air for a given air pollutant and which is protective of human health and public welfare (Health and Safety Code 39606b). CAAQSs are recommended by the California Office of Environmental Health Hazard Assessment and adopted into regulation by the CARB. CAAQSs are the standards which must be met per the requirements of the California Clean Air Act (CCAA).

Federal Reference Method (FRM)

Sample collection methods that, as determined by the U.S. EPA, produce measurements that can be used for comparison to the National Ambient Air Quality Standards. This term is often applied to sampling devices that the U.S. EPA has approved for use in comparison to a NAAQS, e.g., an FRM PM_{2.5} sampler.

Fugitive Dust

Dust particles that are introduced into the air through certain activities such as soil cultivation, or vehicles operating on open fields or dirt roadways. A subset of fugitive emissions.

National Air Monitoring Stations (NAMS)

Monitoring sites that are part of a federal network that is intended to assess long-term trends.

National Ambient Air Quality Standards (NAAQS)

Standards established by the United States EPA that apply for outdoor air throughout the country. There are two types of NAAQS. Primary standards set limits to protect public health and secondary standards set limits to protect public welfare.

Nonattainment Area

A geographic area identified by the U.S. EPA and/or CARB as not meeting either the National Ambient Air Quality Standards or the California Ambient Air Quality Standards for a given pollutant.

Appendix E (continued)

Glossary

Office of Environmental Health Hazard Assessment (OEHHA)

A department within the California Environmental Protection Agency that is responsible for evaluating chemicals for adverse health impacts and establishing safe exposure levels. OEHHA also assists in performing health risk assessments and developing risk assessment procedures for air quality management purposes.

Particulate Matter (PM)

Any material, except pure water, that exists in the solid or liquid state in the atmosphere. The size of particulate matter can vary from coarse, wind-blown dust particles to fine particle combustion products.

PM_{2.5}

A criteria air pollutant consisting of airborne particles with an aerodynamic diameter less than or equal to a nominal 2.5 microns. This fraction of particulate matter penetrates most deeply into the lungs. PM_{2.5} also causes visibility reduction.

PM₁₀

A criteria air pollutant consisting of airborne particles with an aerodynamic diameter less than or equal to a nominal 10 microns (about 1/7 the diameter of a single human hair). Their small size allows them to make their way to the air sacs deep within the lungs where they may be deposited and result in adverse health effects. PM₁₀ also causes visibility reduction.

Precursor

An airborne substance, such as volatile organic compounds, nitrogen oxides, or sulfur oxides, that can change or combine with other substances to form PM_{2.5}.

Regional Haze

The haze produced by a multitude of sources and activities which emit fine particles and their precursors across a broad geographic area. National regulations require states to develop plans to reduce the regional haze that impairs visibility in national parks and wilderness areas.

Secondary Particle

Particles that are formed in the atmosphere. Secondary particles are products of the chemical reactions between gases, such as nitrates, sulfur oxides, ammonia, and organic products.

Spiral Aerosol Speciation Sampler (SASS)

A type filter-based PM_{2.5} speciation sampler that collects 24-hour integrated samples.

State Implementation Plan (SIP)

A plan prepared by states and submitted to U.S. EPA describing how each area will attain and maintain national ambient air quality standards. SIPs include the

technical foundation for understanding the air quality (e.g., emission inventories and air quality monitoring), control measures and strategies, and enforcement mechanisms.

State and Local Air Monitoring Stations (SLAMS)

Sites (which include NAMS sites as a subset) that collect data needed for developing an effective State Implementation Plan (SIP).